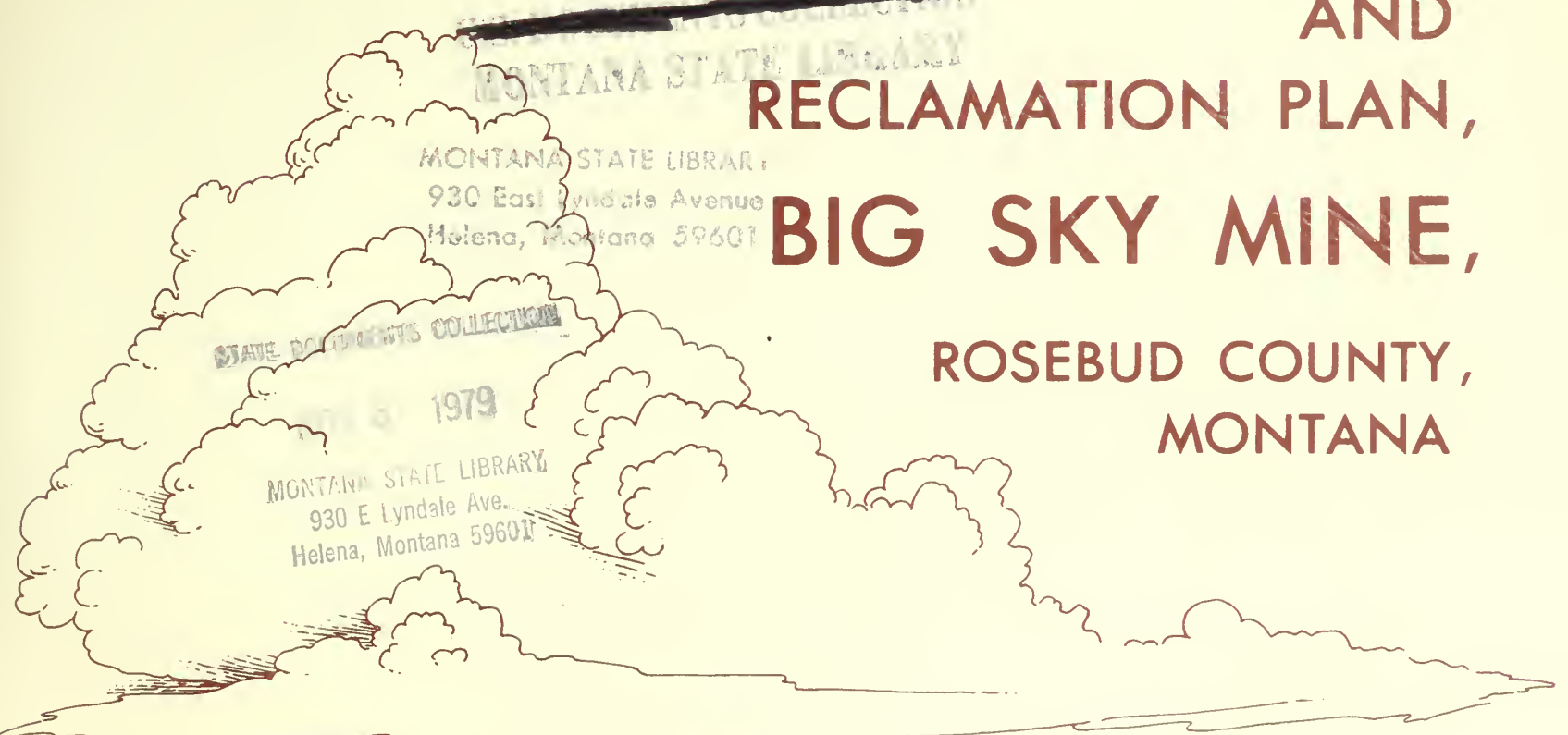


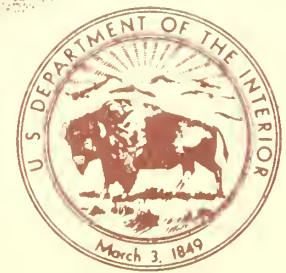
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PLEASE RETURN

**PROPOSED EXPANSION OF MINING
AND
RECLAMATION PLAN,
BIG SKY MINE,
ROSEBUD COUNTY,
MONTANA**

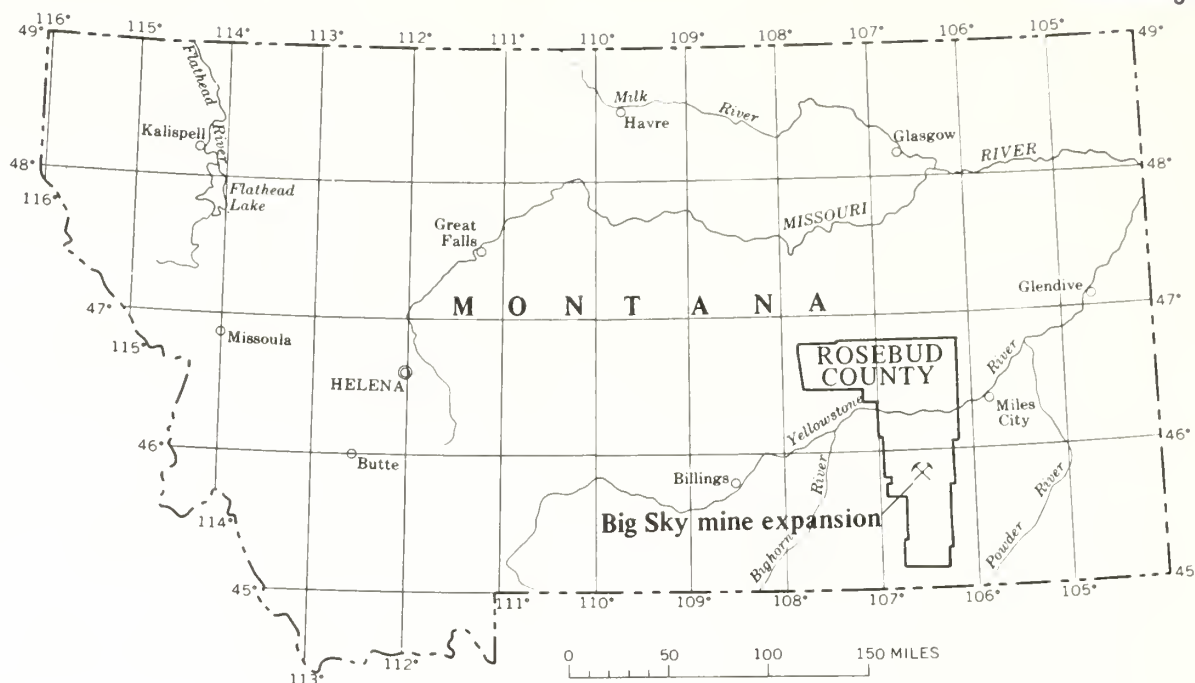


**FINAL
ENVIRONMENTAL STATEMENT**





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English-Metric Conversion Factors

To convert English unit	Multiply by	To obtain Metric unit
Inches (in)-----	2.54	Centimeters (cm).
Feet (ft)-----	3.048×10^1	Centimeters (cm).
	3.048×10^{-1}	Meters (m).
Miles (mi)-----	1.609	Kilometers (km).
Square feet (ft ²)-----	9.290×10^{-2}	Square meters (m ²).
Acres-----	4.047×10^{-1}	Hectares (ha).
	4.047×10^{-3}	Square kilometers (km ²).
Acre-feet (acre-ft)-----	1.233×10^3	Cubic meters (m ³).
	1.233×10^{-3}	Cubic hectometers (hm ³).
Cubic yards (yd ³)-----	7.646×10^{-1}	Cubic meters (m ³).
Pounds (lb)-----	4.536×10^{-1}	Kilograms (kg).
Short tons (tons)-----	9.072×10^{-1}	Metric tons (t).
Pounds per acre (lb/acre)	1.12	Kilograms per hectare (kg/ha).
Btu/lb-----	2.326	Kilojoules per kilogram (kJ/kg).
Gallons (gal)-----	3.785×10^{-3}	Cubic meters (m ³).
Gallons per minute (gal/min)-----	6.309×10^{-2}	Liters per second (L/s).
Degrees Fahrenheit (°F)--	(¹)	Degrees Celsius (°C).

¹Temperature in °C = (temperature in °F - 32)/1.8.

U.S. DEPARTMENT OF THE INTERIOR
MONTANA DEPARTMENT OF STATE LANDS

FINAL
ENVIRONMENTAL STATEMENT

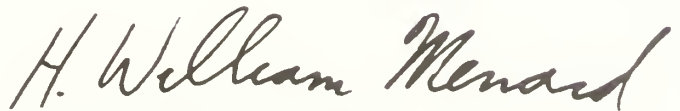
PROPOSED EXPANSION OF MINING
AND RECLAMATION PLAN
BIG SKY MINE

PEABODY COAL COMPANY
ROSEBUD COUNTY, MONTANA
FEDERAL LEASE M-15965

Prepared by
U.S. Geological Survey, Department of the Interior
Montana Department of State Lands



Leo Berry, Jr., Commissioner
Montana Department of State Lands



H. William Menard, Director
U.S. Geological Survey



S/622.33/U12pbd/1979/final
Proposed Expansion of Mining
and Reclamation Plan. Big
Sky mine, Rosebud County, Mt.

DEC 1979

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United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

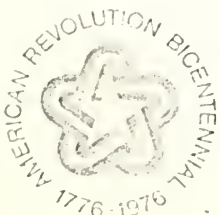
MS DEC 19 79

September 25, 1979

Enclosed for your information is a copy of the final environmental impact statement on the mining and reclamation plan, proposed by the Peabody Coal Company, for the expansion of the Big Sky Mine, Rosebud County, Montana (Federal coal lease M-15965). It was prepared by the Department of the Interior and the Montana Department of State Lands, using the comments received through the public review process. All timely comments on the draft statement and responses to those comments are included. No substantive changes in analysis or conclusions were required as a result of review comments. <Volume I, the draft statement (DES 78-51) transmitted to the Environmental Protection Agency on December 14, 1978, is incorporated by reference in this final statement. Volume II, this statement FES 79-46 was filed the Environmental Protection Agency on September 25, 1979.>

The mining and reclamation plan contained in this statement was submitted for review prior to the revision of the 30 CFR Part 211 regulations (43 F.R. 37181 et seq., August 22, 1978), which incorporated the initial regulatory program under Surface Mining Control and Reclamation Act of 1977 (SMCRA). This plan was also submitted prior to the April 12, 1979, effective date of the permanent regulatory program on Federal lands under SMCRA, 30 CFR Subchapter D, 44 F.R. 15332, March 13, 1979. The company currently is in the process of modifying their mining and reclamation plan to resolve identified problems, and to come into conformance with SMCRA and the Montana Strip and Underground Mine Reclamation Act. Thus, the review of the mine plan and modifications to the mine plan for compliance with the applicable requirements of SMCRA and implementing regulations has not been completed. Prior to making any decision on approval of the mining and reclamation plan, the Office of Surface Mining Reclamation and Enforcement (OSM) will complete the technical review for compliance with SMCRA and the applicable regulations. Once the mine plan conforms to the applicable requirements of those authorities, OSM will determine whether this final environmental impact statement is adequate for mine plan approval action, or whether a supplement or other environmental documents need to be prepared and distributed.

If additional copies are needed, a limited number are available on request from: the U.S. Geological Survey, Land Information and Analysis Office, Box 25046, Federal Center, Mail Stop 701, Denver, Colorado 80225; the Northern Powder River Basin EIS, P.O. Box 1135, Billings, Montana 59103; or the Montana Department of State Lands, 1625 11th Avenue, Helena, Montana 59601.





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United States Department of the Interior

GEOLOGICAL SURVEY

Northern Powder River Basin EIS
P.O. Box 1135
Billings, Montana 59103

September 25, 1979

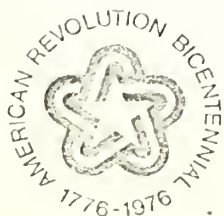
Dear Librarian:

Enclosed is one copy of the final environmental impact statement on the proposed surface coal mining plan by Peabody Coal Company at the Big Sky mine in Rosebud County, Montana. In an effort to make the impact statement available to as many people as possible, we would appreciate having it displayed in your library.

Sincerely yours,

Task Force Leader

Enc.



PREFACE

The final environmental statement (FES) on the Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine incorporates by reference the draft environmental statement (DES 78-51) originally printed and distributed in December 1978. Comments received on the DES did not require significant changes in the data, analyses, or conclusions. Therefore, the DES, with the corrections and explanations herein given, is incorporated as part of the FES.

The FES, then, consists of two volumes--volume I, the original statement (DES 78-51), and volume II, this document. Volume I was not reprinted. A limited number of copies of this volume are available on request from: U.S. Geological Survey, EIAP, Box 25046, Mail Stop 701, Federal Center, Denver, Colorado 80225.

Volume I contains the analysis of the mine plan as proposed in November 1977. Volume II contains revisions in this mine plan as received through July 11, 1979. It also contains explanations in response to comments where no change is necessary. Changes are in the form of revisions, additions, or deletions.

Volumes I and II constitute the final environmental statement.

SUMMARY

() Draft (X) Final Environmental Statement

Department of the Interior, U.S. Geological Survey

Montana Department of State Lands

1. Type of action: (X) Administrative () Legislative

2. Brief description of the action:

State and Federal actions involve either approval or denial of permits for the reclamation plans, Big Sky mine, Peabody Coal Company, Rosebud County, Montana. The company proposes to expand their present mining operation. Existing plant and and loading facilities, haul and access roads, and the existing rail spur extending from Colstrip would be utilized; some haul roads would be lengthened as needed. An estimated 30 million tons of low-sulfur coal would be removed from an area of about 680 acres over a period of about 7 years.

3. Summary of adverse, unavoidable environmental impacts:

- A. Vegetation, soils, and overburden would be incrementally removed from approximately 680 acres.
- B. There would be a loss in vegetative diversity for possibly several decades; there may, however, be an increase in biomass.
- C. Existing local aquifers would be destroyed; the returned spoils, where saturated, would contain water of poor quality, unsuitable for domestic use and probably unsuitable for livestock use.
- D. Wildlife habitat would be altered, and wildlife diversity may be reduced.
- E. Unless best technology currently available were applied during mining, significant dust emissions would increase to about 5,500 tons per year (about 100 percent), exceeding air quality standards. Visibility would be decreased. The amount of fugitive dust could be reduced by about 75 percent using best technology currently available.
- F. A minor increase in population and traffic would occur in the area, owing to the addition of 32 persons to the work force.
- G. The incremental removal and reclamation of about 680 acres over the 7-year period would temporarily affect range, recreation, and wildlife use.
- H. There may be an increase in surface-water runoff and a reduction in both surface- and ground-water quality within the permit area.

- I. Thirty-four known cultural resource sites, varying in historic value, would be disturbed or destroyed on the permit area.
- J. Doubling of train traffic on the 7.5-mile rail spur would increase the hazard of train/vehicle and train/livestock collisions, increase delay at rail crossings, and increase noise and pollution along the right-of-way.

4. Alternatives considered:

Administrative alternatives available to State and Federal agencies include: (a) deferring action, (b) preventing further development by suspending operations, cancelling the lease, or acquiring the lease, (c) rejecting the mine and reclamation plan or restricting development on the lease. Other options available include development of selected areas now under lease and approval of the proposed mining plan after modification. The mining and reclamation plan must be modified to meet criteria set forth in the Surface Mining Control and Reclamation Act of 1977 and the Montana Strip and Underground Mine Reclamation Act of 1973 and other pertinent criteria. Agencies may also add stipulations to the permit which would minimize the environmental impacts by imposing various technical alternatives. The major stipulations to be considered include: the use of lowest achievable emission rates for all mine dust and gaseous emissions, implementation of a monitoring system for ambient air, selective salvage and replacement of soils to better simulate premining conditions, reduction of slope lengths to minimize erosion, and redesigning diversion channels for higher intensity storms.

5. Comments have been requested from: (See Summary Attachment.)

6. Date the draft was made available to the Governor of Montana, Montana EQC, Federal CEQ, and the public: December 14, 1978.

Date the final was made available:

FES 79-

SUMMARY ATTACHMENT

Comments were requested from the following and were received from those marked by an asterisk:

Federal agencies

- Advisory Council on Historic Preservation*
- Federal Energy Regulatory Commission
- Interstate Commerce Commission
- U.S. Department of Agriculture:
 - Forest Service
 - Soil Conservation Service*
- U.S. Department of the Army:
 - Corps of Engineers*
- U.S. Department of Commerce:
 - Old West Regional Commission
- U.S. Department of Energy
- U.S. Department of Health, Education, and Welfare*
- U.S. Department of Housing and Urban Development
- U.S. Department of Interior:
 - Bureau of Indian Affairs*
 - Bureau of Land Management
 - Bureau of Mines*
 - Bureau of Reclamation*
 - Fish and Wildlife Service*
 - Heritage Conservation and Recreation Service*
 - National Park Service*
 - Office of Surface Mining
- U.S. Department of Labor:
 - Mining Safety and Health Administration*
- U.S. Department of Transportation
- U.S. Environmental Protection Agency*

State and local agencies

- Office of the Governor, Montana
- Office of the Governor, Wyoming
- Montana Agricultural Experiment Station
- Montana Bureau of Mines and Geology
- Montana Department of Agriculture:
 - Pesticide Division*
- Montana Department of Community Affairs
- Montana Department of Fish and Game*
- Montana Department of Health and Environmental Sciences*
- Montana Department of Highways*
- Montana Department of Natural Resources and Conservation
- Montana Department of Revenue
- Montana Energy Advisory Council
- Montana Environmental Quality Council
- Montana State Historic Preservation Office*
- Board of County Commissioners, Big Horn County, Montana
- Board of County Commissioners, Rosebud County, Montana
- Board of County Commissioners, Sheridan County, Wyoming
- Mayor, City of Sheridan

Tribal councils
Northern Cheyenne

Applicant
Peabody Coal Company*

Contents

VOLUME I

(Incorporated by reference)

VOLUME II

	Page
Preface-----	iii
Summary-----	v
Summary attachment-----	vii
 Chapter I. Revisions in the mine and reclamation plan-----	 I-1
A. Introduction-----	I-1
B. Revisions-----	I-1
C. Impacts-----	I-5
1. Geomorphology and topography-----	I-5
2. Surface water-----	I-9
3. Air quality-----	I-9
4. Soils-----	I-9
5. Vegetation-----	I-11
6. Wildlife-----	I-11
7. Cultural resources-----	I-11
8. Esthetics-----	I-12
 Chapter IX. Consultation and coordination-----	 IX-1
A. Organization of State and Federal interagency task force for the environmental statement-----	 IX-1
B. Development of this statement-----	IX-1
C. Review of this document-----	IX-2
D. Comments and responses-----	IX-3
1. Advisory Council on Historic Preservation-----	IX-4
U.S. Department of Agriculture:	
2. Soil Conservation Service-----	IX-5
U.S. Department of the Army:	
3. Corps of Engineers-----	IX-6
4. U.S. Department of Health, Education, and Welfare	IX-8
U.S. Department of the Interior:	
5. Bureau of Indian Affairs-----	IX-9
6. Bureau of Mines-----	IX-10
7. Bureau of Reclamation-----	IX-11
8. Fish and Wildlife Service-----	IX-12
9. Heritage Conservation and Recreation Service---	IX-14
10. National Park Service-----	IX-16
U.S. Department of Labor:	
11. Mining Safety and Health Administration-----	IX-17
12. U.S. Environmental Protection Agency-----	IX-18
Montana Department of Agriculture:	
13. Pesticide Division-----	IX-20
14. Montana Department of Fish and Game-----	IX-21
15. Montana Department of Health and Environmental Sciences-----	IX-22

	Page
Chapter IX. Consultation and coordination--Continued	
D. Comments and responses--Continued	
16. Montana Department of Highways-----	IX-23
17. Montana State Historic Preservation Office-----	IX-24
18. Burlington Northern-----	IX-25
Ecological Consulting Service:	
19. First letter-----	IX-32
20. Second letter-----	IX-37
21. Peabody Coal Company-----	IX-39
22. Environmental Information Center-----	IX-72
23. P. Kluver-----	IX-74
24. G. Pallister-----	IX-77
25. S. Walthall-----	IX-79
Chapter X. References-----	X-1
Chapter XI. Appendixes-----	XI-1
A. Letter from the Montana Department of State Lands to Peabody Coal Company-----	XI-1
B. Locomotive emission factors-----	XI-21

Figures

	Page
Figure I-1. Mining sequence for revised plan-----	I-2
I-2. Postmining topography of revised plan-----	I-4
I-3. Seeding and planting plan-----	I-8
I-4. Particulate emissions in the nonattainment area---	I-10

Tables

	Page
Table I-1. Seeding and planting mixtures-----	I-6
I-2. Estimated sediment yield-----	I-9

CHAPTER I

REVISIONS IN THE MINE AND RECLAMATION PLAN

A. INTRODUCTION

This section summarizes the mine plan and describes those revisions made in the original mine and reclamation plan described in volume I, the draft statement. Most revisions were made in response to a June 5, 1978, letter from the Montana Department of State Lands (appendix P, page XI-60, volume I). These revisions were designed to bring the mine plan into compliance with the Surface Mining Control and Reclamation Act of 1977 and the Montana Strip and Underground Mine Reclamation Act of 1973. Further revisions were submitted on July 11, 1979, as a deficiency letter (appendix A, volume II) was being mailed to the company from the Department of State Lands.

Peabody Coal Company's Big Sky mine, located in south-central Rosebud County, Montana, is approximately 5 miles south of Colstrip and 10 miles north of the Northern Cheyenne Indian Reservation. The company proposes to expand its existing operation from 2.3 mty (million tons per year) to approximately 4.2 mty, mining about 30 million tons of coal by 1985. This plan is an expansion of the existing operation and would require the addition of 32 more persons to the existing work force. No new facilities would be required.

This analysis reviews changes in the mine and reclamation plan as of July 11, 1979. The company is still in the process of modifying its plan to meet the requirements of the Montana Department of State Lands (DSL) and the Office of Surface Mining (OSM). Changes in response to agency requests would decrease the impacts from mining. Changes required by the regulatory agencies will be considered in an environmental assessment prior to agency approval.

B. REVISIONS

The revised mine plan (fig. I-1) covers an area of 1,071 acres, compared to the original 1,978 acres. Of this, about 680 acres would be disturbed by mining. Coal reserves would be mined at approximately the same rate as originally proposed:

<u>mty</u>	<u>mty</u>
1979-----2.3	1983-----4.1
1980-----3.2	1984-----4.0
1981-----4.3	1985-----4.6
1982-----3.6	

Peabody also proposes the following changes and additions to the mine and reclamation plan described in volume I (the draft environmental statement - DES 78-51):



Figure I-1.—Mining sequence for the revised plan.

Peabody would control water above and within the active pit and would intercept, divert, and discharge surface runoff around large unstable fills.

Salvaged topsoil would be double-lifted to segregate the A and B horizon materials from the rest of the topsoil, and whenever possible soils would be directly transferred to a graded area. Soil stockpiles would be seeded in the first appropriate season to reduce erosion.

The company will cover all coal seams with a minimum of 4 feet of nontoxic and noncombustible material, and will bury materials not conducive to revegetation techniques, establishment, and growth, at least 8 feet deep.

The large depressions described in chapter III of the DES have been deleted and the company has stated that it would construct small depressions on the reclaimed areas as approved by the Department of State Lands. These depressions would have a holding capacity of less than 1 cubic yard. If any depression has a greater holding capacity, Peabody would grade the slopes to ensure that flow would not be restricted. Regulatory agencies must, however, be provided with detailed descriptions of these small depressions prior to their being acceptance. The revised postmining topography is shown in figure I-2.

The company also proposes to lower the original elevation of the base of the buttes to the proposed crop line, in order to preserve hydrologic integrity. In addition they propose to create a concave stream channel, where possible, to alleviate the possibility of creating a knick point. If a convex profile lacks stability, Peabody proposes to do one of the following: integrating the stream gradient above the coal recovery line into undisturbed native range, constructing a permanent stockwatering impoundment above the recovery line, constructing check dams, constructing a riprap channel in the undisturbed mine zone, establishing a permanent vegetative cover in the channel bottom, or mining to the sandstone bluffs to avoid constructing channels that would increase the stream's erosive dynamics. The regulatory agencies however must approve alternatives prior to their implementation by the company. Peabody must also demonstrate that feathering will not exceed the threshold of the drainage. (See appendix A, p. 3, volume II.) The alternatives proposed by the company are deficient, as described in appendix A, page 4.

Spoil surfaces shall be left roughened but in final contour form. Peabody still proposes to reduce highwalls to a slope no greater than 3:1. However, the regulatory agencies will require 5:1 slopes on reduced highwalls because DSL has found that 3:1 slopes in this area generally have a low probability of success. The company would redistribute topsoil to an approximately uniform thickness, avoiding excessive soil compaction, and would plant an annual and/or perennial cover crop immediately for stabilization. Soils amendments would be applied as indicated by research and soils analyses.

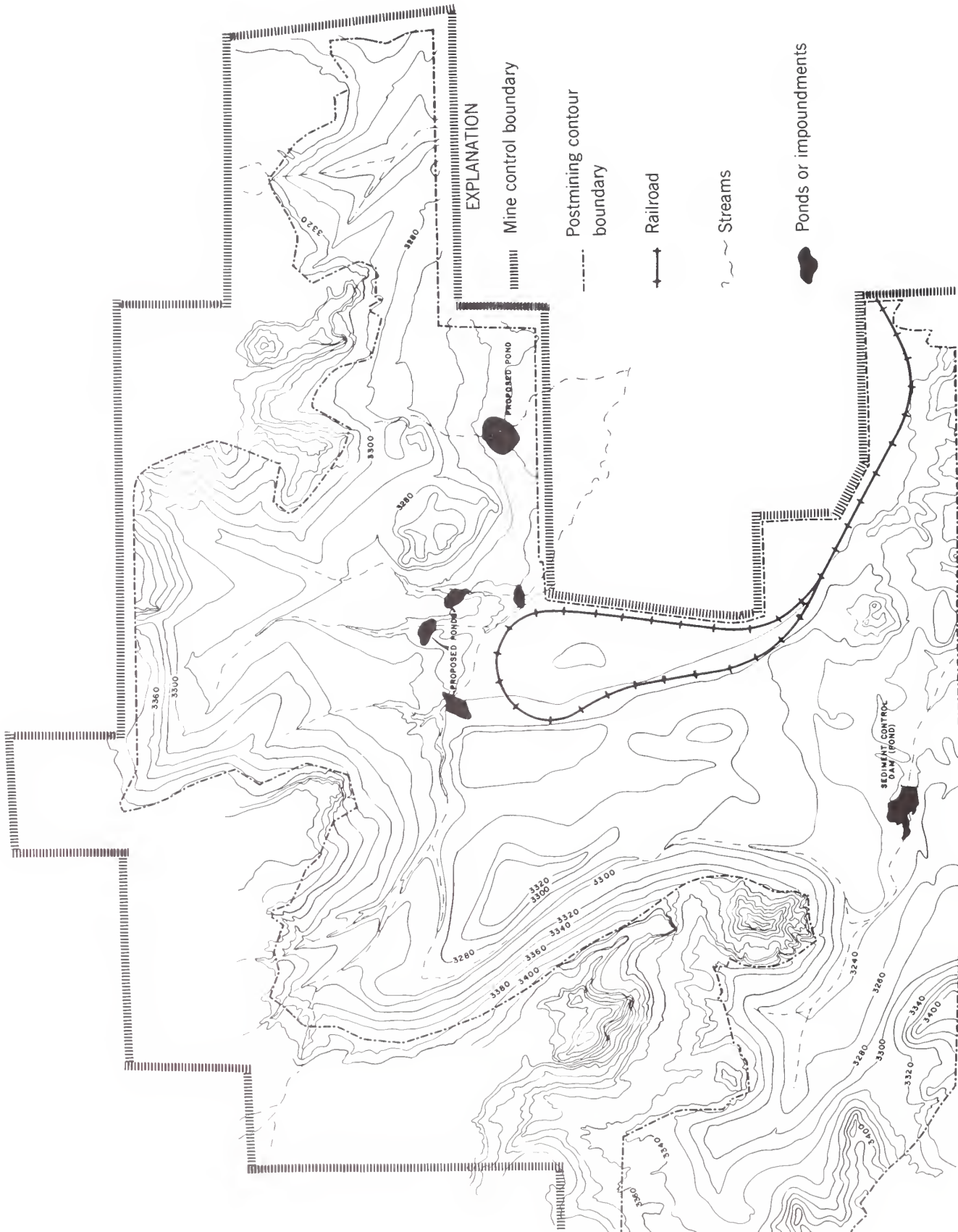


Figure I-2.—Postmining topography of revised plan.

Several changes have been made in the seeding mixture. Most significant is the development of specific seed and planting mixes to accommodate site-specific conditions. (See table I-1 and figure I-3.) Trees and shrubs would be planted in appropriate locations to further benefit wildlife and increase esthetic value, using bare root and container stock. Peabody would also use transplants from premined areas. Straw or hay mulch would be applied at a rate of 300 lbs/acre on all slopes greater than 10:1 and a temporary cover crop would be established on all disturbed areas after final preparation of topsoil.

Peabody has proposed to "cross-drill" their seed mixture. In other words, the area is to be drilled from two different directions, obliquely across slope contours. Half the seed would be drilled from each direction. The company states that this would help give the establishing vegetation a more natural appearance and would reduce the possibility of water flow along drill rows, which in turn would help minimize erosion.

Should any rills and gullies deeper than 9 inches develop in the resurfaced areas, the unvegetated areas would be stabilized and reseeded. Replacement of topsoil with a minimum of smoothing and back-dressing would offer maximum resistance against wind and water erosion until vegetative cover has been established.

C. IMPACTS

1. Geomorphology and Topography

The most recent revision of the postmining topography reduces impacts discussed in the draft EIS. Specifically, the proposed depressions have been removed, and the integration of the mined area with the undisturbed drainage system is greatly increased, although not complete. Drainage profiles in the area of the highwall reduction have not been finalized.

A major erosion problem may develop at the base of the sandstone bluffs where the highwalls are to be reduced. Prior to mining, the infiltration capacity of the sandy soils at the base of the bluffs is very high, and there is very little drainage-system development in these soils. A reduced highwall, however, would have a low infiltration capacity, causing surface water flowing from the undisturbed bluffs to run overland and cause erosion. The proposed highwall reduction at the far west end of the mining area would have a straight slope of about 25 percent with no drainage channels. Gullying would probably be initiated.

Small depressions of less than 1 cubic-yard have been proposed for the reclaimed surface. They would have no effect on erosion rates and would reduce sediment yields only until they were filled. This would require a relatively short time, certainly less than 5 years, at most. Once filled, sediment yield would increase. Estimated sediment yields for the mine pit, based on the disturbance and reclamation schedule currently proposed by the company, are given in table I-2.

Table I-1.--Seeding and planting mixtures

	Pounds/acre, PLS ²	
	Drilled	Broadcast
Seed mix No. 1 ¹		
<u>Agropyron dasystachyum</u> , Thickspike wheatgrass---	4	6.5
<u>Agropyron riparium</u> , Streambank wheatgrass-----	2	3
<u>Agropyron smithii</u> , Western wheatgrass-----	4	6.5
<u>Agropyron spicatum</u> v. <u>inerme</u> , Beardless bluebunch wheatgrass-----	2	3
<u>Agropyron trachycaulum</u> , Slender wheatgrass-----	2	3
<u>Bouteloua curtipendula</u> , Sideoats grama-----	2	3
<u>Bromus biebersteinii</u> , Regar brome-----	1	1.5
<u>Elymus triticoides</u> , Creeping wildrye-----	2	3
<u>Stipa viridula</u> , Green needlegrass-----	4	6.5
<u>Astragalus cicer</u> , Cicer milkvetch-----	1	1.5
<u>Linum perenne</u> , Blue flax-----	0.5	1
<u>Medicago sativa</u> , Alfalfa-----	1	1
<u>Melilotus officinalis</u> , Yellow sweetclover-----	0.5	0.5
Total-----	26	40
Seed mix No. 2 ³		
<u>Agropyron dasystachyum</u> , Thickspike wheatgrass---	2	4
<u>Agropyron riparium</u> , Streambank wheatgrass-----	2	4
<u>Agropyron smithii</u> , Western wheatgrass-----	4	8
<u>Bromus biebersteinii</u> , Regar brome-----	1	2
<u>Elymus triticoides</u> , Creeping wildrye-----	2	4
<u>Poa compressa</u> , Canada bluegrass-----	1	1
<u>Sporobolus airoides</u> , Alkali sakaton-----	0.5	0.5
<u>Sporobolus cryptandrus</u> , Sand dropseed-----	0.25	0.25
<u>Stipa viridula</u> , Green needlegrass-----	4	8
<u>Astragalus cicer</u> , Cicer milkvetch-----	1	2
<u>Medicago sativa</u> , Alfalfa-----	1	2
<u>Eragrostis curvula</u> , Weeping lovegrass-----	0.5	0.5
<u>Eragrostis trichodes</u> -----	0.5	0.5
Total-----	19.75	36.75
Seed mix No. 3--Topsoil stockpiles		
<u>Agropyron smithii</u> , Western wheatgrass-----	4	8
<u>Agropyron trachycaulum</u> , Slender wheatgrass---	4	8
<u>Bromus biebersteinii</u> , Regar brome-----	4	8
<u>Medicago sativa</u> , Alfalfa-----	4	8
Total-----	16	32

¹This mix will be planted on all areas of the site which are not main drainage courses or topsoil stockpiles. It will also be used for final reclaiming of roads, the railroad, the office site, the stockpile areas, and reclaimed ditches and sediment ponds. This mix will be used on south-facing slopes in conjunction with tree and shrub planting list No. 2. It will occasionally be used along drainage courses with tree and shrub planting list No. 1. This mix is most suited to south-facing slopes, the upper portions of north-facing slopes, and hill crests.

Table I-1.--Seeding and planting mixtures--Continued

	Maximum plants/acre
Tree and shrub planting list No. 1--Moist sites	
<u>Fraxinus pennsylvanica</u> , Red ash-----	75
<u>Juniperus scopulorum</u> , Rocky mountain juniper-----	75
<u>Sheperdia argentea</u> , Silver buffaloberry-----	150
<u>Symphoricarpus occidentalis</u> , Western snowberry---	75
<u>Rhus trilobata</u> , Skunkbush sumac-----	75
<u>Pinus ponderosa</u> , Ponderosa pine-----	150
<u>Prunus virginiana</u> , Common chokecherry-----	75
<u>Prunus americana</u> , American plum-----	75
<u>Populus</u> , spp., Cottonwood-----	50
<u>Ribes aureum</u> , Golden current-----	75
<u>Elaeagnus augustifolia</u> , Russian olive-----	50
<u>Caragana arborescens</u> , Siberian peashrub-----	75
Recommended inclusions:	
<u>Prunus besseyi</u> , Bessey cherry-----	75
<u>Sherperdia canadensis</u> , Russet buffaloberry----	150
<u>Ribes cereum</u> , Wax current-----	75
<u>Symphoricarpus albus</u> , Common snowberry-----	75
<u>Salix</u> spp., Willow-----	100
<u>Rosa woodsii</u> , Woods rose-----	75
<u>Purshia tridentata</u> , Antelope bitterbrush-----	75
<u>Amelanchier alnifolia</u> , Saskatoon serviceberry-	75
Tree and shrub planting list No. 2--Dryland sites	
<u>Juniperus scopulorum</u> , Rocky mountain juniper-----	75
<u>Pinus ponderosa</u> , Ponderosa pine-----	150
<u>Elaeagnus augustifolia</u> , Russian olive-----	50
<u>Caragana arborescens</u> , Siberian peashrub-----	75
Recommended inclusions:	
<u>Atriplex canescens</u> , Fourwing saltbush-----	150
<u>Atriplex confertifolia</u> , Shadscale saltbush-----	100
<u>Atriplex gardneri</u> , Nuttall saltbush-----	150
<u>Atriplex tridentata</u> (no common name)-----	150
<u>Ceratoides lanata</u> , Common winterfat-----	75
<u>Artemisia arbutanum</u> , Oldman wormwood-----	75

²PLS = Pure live seed.

³Seed mix No. 2 will be used in all stream courses, main drainageways and along the banks of drainageways, and on north-facing slopes. It will be used on north slopes in conjunction with tree and shrub planting list No. 1, and on the lower portion of south-facing slopes near water courses or drainageways, in conjunction with tree and shrub planting list No. 2.

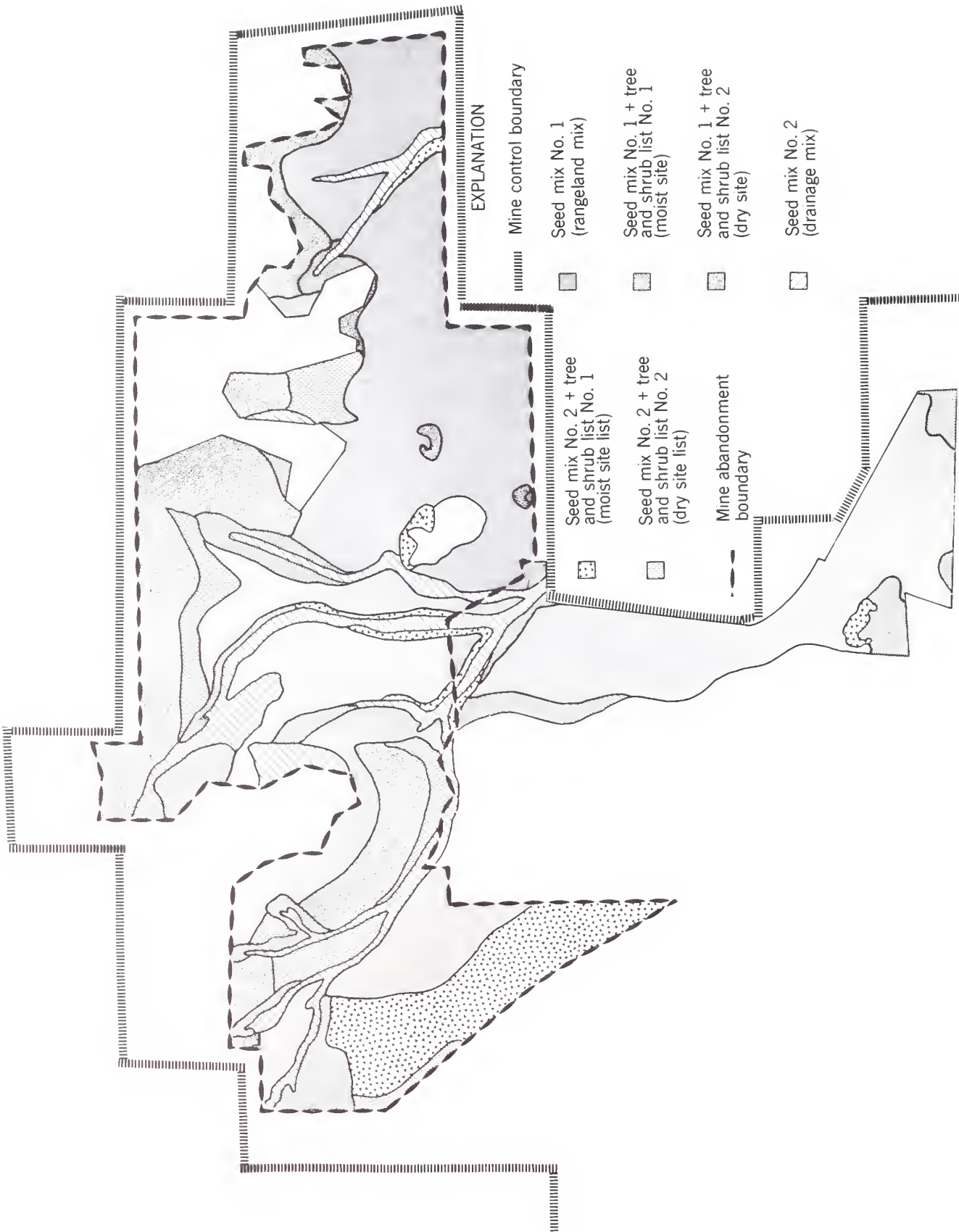


Figure I-3.—Seeding and planting plan.

Table I-2.--Estimated sediment yield

Year	Acres		Acres reclaimed	Sediment yield (ac-ft/mi ² /yr)
	Disturbed	Undisturbed		
1979-----	108.72	568.28	0	1.31
1980-----	104.79	463.49	155	1.55
1981-----	115.15	348.34	136	1.82
1982-----	74.42	263.92	74	1.70
1983-----	71.96	191.96	81	1.54
1984-----	90.91	101.05	78	1.54
1985-----	57.93	52.74	73	1.58
1986-----	52.74	---	49	1.45
1987-----	---	---	31	1.27
1988-----	---	---	---	1.14
1989-----	---	---	---	1.07
1990-----	---	---	---	Normal ¹

¹Assumptions--1 ac-ft/mi²/yr is normal; this increases to 2.5 ac-ft/mi²/yr due to mining disturbance. Years 1 and 2 of reclamation are assumed to yield 2.5 ac-ft/mi²/yr. In year 3 this is reduced to 1.25 ac-ft/mi²/yr and it returns to normal in year 4.

2. Surface Water

The impact of reduced sediment load depends on the amount of water passed through the settling ponds. Water quantity would depend upon the settling ponds' longevity, the number and magnitude of runoff events, and the amount of mine-pit water added to the streamflow.

3. Air Quality

Locomotive emission factors from appendix D of the draft (volume I) are changed as shown in appendix B of this volume.

Figure I-4 shows projected annual TSP in 1985 based on computer modelling that was not completed at the time the DES was published. Further information can be found in the regional (DES 79-41, U.S. Department of the Interior and Montana Department of State Lands).

4. Soils

The major avoidable impact to soils described in the draft EIS would have been caused by deliberate creation of a number of closed depressions in the reclamation surface. These have been eliminated in the revised mine and reclamation plan. However, the company now proposes an unspecified but apparently large number of small depressions (less than 1 cubic-yard capacity). Any beneficial impact would be minimal, however, because they would become partially or completely sealed and filled with sediment.

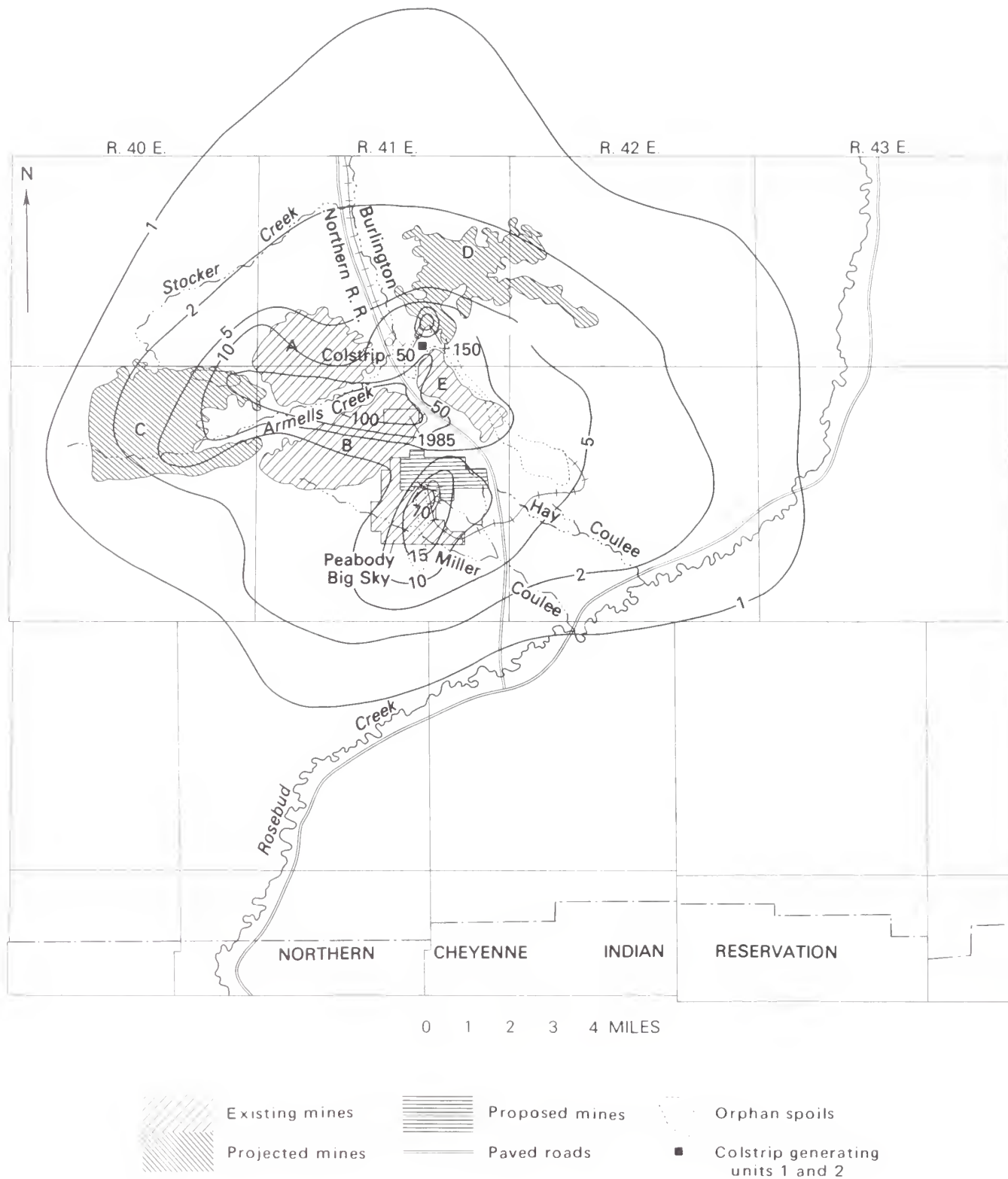


Figure I-4.—Particulate emissions (tons/mi²/mo) in the nonattainment area.

The sediment would be less hospitable to vegetation than the adjacent replaced topsoil. Salts would accumulate in the depressions by evaporation, possibly becoming saline ($EC > 4$). Small depressions would not pose a significant threat to animals.

Soil salinity may be more problematic than indicated in the draft EIS. Although DSL guidelines specify a saturated paste extraction for determining electrical conductivity (EC), the company submitted EC values based on 1:5 soil:water extracts, as described in appendix 8-2 of the company application. This procedure is easier to perform but considerably less useful than the one prescribed, and there is no consistent correlation between the two. The only uniform relationship is that the values derived from a 1:5 extraction are lower than those from a paste extraction.

5. Vegetation

The impacts to vegetation would not change; however, a revised seed mixture has been submitted which still has deficiencies. The company still proposes to seed excessive amounts of alfalfa and yellow sweet clover, in spite of requests to decrease the seeding rate (volume I, appendix P, page IX-85). The company is still relying on natural reinvasion of forbs, contrary to requests by the regulatory agencies to seed more forbs. The single addition of blue flax to the seed mixture is an insufficient response.

Peabody's "cross drilling" proposal is still being reviewed by the regulatory agencies. Contrary to company statements, water flow velocities along an oblique drill row would be greater than along a horizontal (contour) drill row. This may, in fact, enhance rill and gully erosion. The company statement that "cross drilling" would give a more natural appearance is true only in the short term. Drill rows on the contour would fill in with time. Once erosion begins, cross drilling would not give a more natural appearance even in the short term.

6. Wildlife

Impacts to wildlife should be reduced because of the improved nature of the seeding and planting proposals. In addition, since most of the bluffs would no longer be mined, impacts to birds, and to raptors in particular, would be reduced.

7. Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320) and the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR part 800) will be complied with prior to the approval of any undertaking which would affect cultural properties included in or eligible for inclusion in the National Register of Historic Places.

8. Esthetics

Impacts to esthetics would be reduced because of the improved nature of the proposed seeding and planting mixtures.

CHAPTER IX

CONSULTATION AND COORDINATION

A. ORGANIZATION OF STATE AND FEDERAL INTERAGENCY TASK FORCE FOR THE ENVIRONMENTAL STATEMENT

Instructions to prepare regional and site-specific environmental statements for the Northern Powder River coal basin were issued to the Geological Survey and the Bureau of Land Management by the Secretary of the Department of the Interior on April 29, 1976. The Geological Survey was designated lead agency. Because of some duplicate or closely related actions pending before Federal and State agencies, and because of the Montana Environmental Policy Act, the State of Montana joined with the Federal task force in September 1976 in the preparation of these environmental statements. This statement has been prepared in conjunction with the site specifics for the Spring Creek and Pearl mines, as well as with the Northern Powder River Basin regional statement which discusses the cumulative effects of these three site specifics.

B. DEVELOPMENT OF THIS STATEMENT

Public notice was given in November 1977 that an environmental impact statement was to be prepared on the proposed Big Sky mine expansion mine and reclamation plan by a joint State-Federal task force. The State task force personnel were under the administrative supervision of a State coordinator attached to the Office of the Commissioner of State Lands. On July 5, 1978, a directive was issued by the U.S Department of the Interior and the Montana Department of State Lands to issue the Big Sky site-specific EIS as a separate document, in advance of the regional document.

In preparation of this draft statement, data and/or review comments were solicited from a wide range of State and Federal agencies, county and city officials, consultants, and private interest groups.

A close working relationship was established with State and local agencies in Montana. All divisions of Montana State government having jurisdictional interests in the projects have been contacted and many have supplied data.

During the preparation of this preliminary draft environmental statement, consultation and coordination was made with the following organizations:

Federal agencies

- Advisory Council of Historic Preservation
- U.S. Department of Agriculture:
 - Forest Service
 - Soil Conservation Service
- U.S. Department of the Interior:
 - Bureau of Indian Affairs
 - Bureau of Mines

Federal agencies--Continued

U.S. Environmental Protection Agency
U.S. Interstate Commerce Commission
U.S. Department of Labor:
Mining Safety and Health Administration

State of Montana

Office of the Governor
Agricultural Experiment Station
Bureau of Mines and Geology
Department of Community Affairs
Department of Fish and Game
Department of Health and Environmental Sciences
Montana Historical Society

The Peabody Coal Company provided data and information on their proposed activities.

Archeological reconnaissance of the Federal lease (sec. 14) was provided by the contractual services of Anthropologos Research International, Inc., of Livingston, Montana, to supplement the data provided by the Montana Departments of Natural Resources and Conservation, Highways, Health and Environmental Sciences, and Fish and Game; Montana State University Department of Agricultural Economics; and University of Montana Department of Environmental Studies. Further reconnaissance was provided by the Mineral Research Center, Butte, Montana.

C. REVIEW OF THIS DOCUMENT

The draft environmental statement (DES 78-51) was filed with the Environmental Protection Agency and the Montana Environmental Quality Council on December 14, 1978. Public notice of the publication and the availability of the site-specific DES was given and was publicized in the local news media.

The comment period began at the same time and ended on February 5, 1979. In accordance with the CEQ guidelines, copies of the draft were made available to the public for inspection and review at appropriate Federal and State offices at the time the document was released. The draft environmental statement was and the final will be available for public review at the following places:

U.S. Geological Survey Library, 1526 Cole Boulevard, Golden, Colorado 80401
U.S. Geological Survey Library, Room 4A100, USGS National Center, 12201 Sunrise Valley Drive, Reston, Virginia 22092
Montana Department of State Lands, 1625 11th Ave., Helena, Montana 59601
Bureau of Land Management, P. O. Box 940, Miles City, Montana 59301
Parmley Billings Public Library, 510 North Broadway, Billings, Montana 59101

Sheridan County Fulmer Public Library, 320 North Brooks, Sheridan,
Wyoming 82801
Big Horn County Public Library, 419 North Custer Ave., Hardin, Montana
59034
Montana State Library, State of Montana, 930 East Lyndale, Helena,
Montana 59601
Rosebud County Library, 201 North 9th Ave., Forsyth, Montana 59327

A limited number of copies are available on request from the U.S.
Geological Survey, Box 25046, Mail Stop 701, Federal Center, Denver, Colorado
80225; the Montana Department of State Lands, 1625 11th Ave., Helena,
Montana 59601; and the Northern Powder River Basin EIS Task Force, P. O.
Box 1135, Billings, Montana 59103.

Written comments were received from agencies identified below:

Federal agencies

Advisory Council on Historic Preservation
U.S. Department of Agriculture:
Soil Conservation Service
U.S. Department of the Army:
Corps of Engineers
U.S. Department of Health, Education, and Welfare
U.S. Department of Interior:
Bureau of Indian Affairs
Bureau of Mines
Bureau of Reclamation
Heritage Conservation and Recreation Service
National Park Service
U.S. Department of Labor:
Mining Safety and Health Administration
U.S. Environmental Protection Agency

State agencies

Montana Department of Agriculture:
Pesticide Division
Montana Department of Fish and Game
Montana Department of Health and Environmental Sciences
Montana Department of Highways
Montana State Historic Preservation Office

Applicant

Peabody Coal Company

D. COMMENTS AND RESPONSES

Letters received during the comment period, along with task force
responses, are printed on the following pages.

LETTER I

**Advisory
Council On
Historic
Preservation**

1522 K Street NW
Washington D.C.
20005

January 10, 1979

Director
United States Geological Survey
National Center, Mail Stop 108
Reston, Virginia 22092

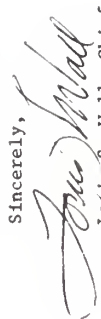
Dear Sir:

This is in response to your request of January 2, 1979, for comments on the draft environmental statement for the proposed expansion of Mining and Reclamation Plan, Big Sky Mine, Peabody Coal Company, Rosebud County, Montana, Federal Lease M-15965. We have reviewed the statement and note that the undertaking will affect 34 archaeological sites, properties that may be eligible for inclusion in the National Register of Historic Places.

Pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320) Federal agencies must, prior to the approval of the expenditure of any Federal funds or prior to the granting of any license, permit, or other approval for an undertaking, afford the Council an opportunity to comment on the effect of the undertaking upon properties included in or eligible for inclusion in the National Register of Historic Places.

Until the requirements of Section 106 are met, the Council considers the draft environmental statement incomplete in its treatment of historical, archaeological, architectural and cultural resources. To remedy this deficiency, the Council will provide, in accordance with its "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800), substantive comments on the effect of the undertaking on these properties. Please call Brit Allan Storey at (303) 234-4946 to assist you in completing this process.

Sincerely,



Louis S. Wall, Chief
Western Office
Review and Compliance

Action is currently being taken by the Bureau of Land Management, the Office of Surface Mining, the State Historic Preservation Office, the Montana Department of State Lands, and the company to insure that all requirements of Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593 are complied with regarding cultural resources within the Big Sky permit area. The mining and reclamation plan will not be approved by Federal and State regulatory authorities until the Section 106 process has been completed.

Add to chapter 111 (N): Peabody will comply with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C., Sec. 470f, as amended, 90 Stat. 1320) and the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR part 800) prior to the approval of any undertaking which will affect cultural properties included in or eligible for inclusion in the National Register of Historic Places.

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

P. O. Box 970, Bozeman, Montana 59715

February 2, 1979

Director, U.S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Sir:

1 We acknowledge receipt of the draft environmental statement for the Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, in Rosebud County, Montana, that was addressed to the Soil Conservation Service on December 14, 1978, for review and comment.

We have reviewed the above draft environmental statement and find that there are no controversial items in the statement within the realm of the Soil Conservation Service's expertise and responsibilities. We find no conflict with any SCS on-going or planned programs or projects.

We appreciate the opportunity to review and comment on this proposed project.

Sincerely,

Van K Haderlie
Van K Haderlie
State Conservationist

cc: Director, Office of Federal Activities, EPA, Room 537, Washington D.C. (5 copies)
R. M. Davis, Administrator, SCS, Washington, D.C.
Kenneth L Williams, Director, WTSC, Portland, OR

1 Thank you for your comments.



LETTER 3



DEPARTMENT OF THE ARMY
OMAHA DISTRICT CORPS OF ENGINEERS
6014 U S POST OFFICE AND COURTHOUSE
OMAHA NEBRASKA 68102

MROFD-M

9 January 1979

Mr. H. William Menard, Director
U.S. Geological Survey National Center
Mail Stop 108
Reston, Virginia 22092

Dear Mr. Menard:

Thank you for the opportunity to review and comment on the Draft Environmental Statement on the proposed surface coal mining operation by the Peabody Coal Company at the Big Sky mine in Rosebud County, Montana.

We have reviewed the proposed project pursuant to the requirements of a Department of the Army permit. Based on the Draft Environmental Statement, the proposed project is located on streams that have an average annual flow of less than 5 cubic feet per second. Accordingly, as long as there is no fill placed in a wetland area, the proposed project is authorized under current regulations provided the following conditions are adhered to:

- a. That the fill will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species;
- b. That the fill will consist of suitable material free from toxic pollutants in other than trace quantities;
- c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution; and
- d. That the fill will not occur in a component of the National Wild and Scenic River System or in a component of a State Wild and Scenic River System.

In addition to the conditions specified above, the following management practices should be followed to the maximum extent practicable in the performance of the work:

Comments noted. No wetland areas occur within the permit area; hence, no fill would be placed in such an area.

LETTER 3

MEMPHIS

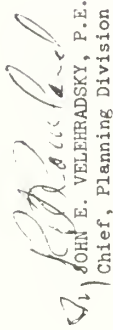
Mr. H. William Menard

9 January 1979

- a. That fill in spawning areas during spawning seasons should be avoided;
- b. That fill in wetlands areas should be avoided;
- c. Heavy equipment working in wetlands should be placed on mats;
- d. That fill into breeding and nesting areas for migratory waterfowl should be avoided; and
- e. All temporary fills should be removed in their entirety.

Please furnish a copy of the Final Environmental Statement when it becomes available.

Sincerely yours,


JOHN E. VELEHRADSKY, P.E.
Chief, Planning Division

LETTER 4



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGION VIII
FEDERAL OFFICE BUILDING
19TH AND STOUT STREETS
DENVER, COLORADO 80294

January 10, 1979

OFFICE OF THE
PRINCIPAL REGIONAL OFFICIAL

Refer to: ROFEC

Mr. H. William Menard
Director
U. S. Geological Survey
Department of the Interior
Reston, Virginia 22092

Dear Mr. Menard:

1 This will acknowledge receipt of your Draft EIS on the proposed expansion of mining on the Big Sky Mine located in Rosebud, Montana.

1 Thank you for your comments.

We have reviewed the Statement and believe you have adequately addressed the impacts expected to result from this activity. Our Regional Commissioner for Educational Programs indicates that the project should not cause any difficulty with respect to education. At the present time the Forsyth School District, which will be most affected, is completing a school building program and expects to have adequate capacity for any increased enrollment that may result from this increased mining activity.

Sincerely yours,

Thomas E. Moore
Director, ROFEC
Regional Environmental Officer



United States Department of the Interior
BUREAU OF INDIAN AFFAIRS

BILLINGS AREA OFFICE
316 NORTH 26TH ST
BILLINGS MONTANA 59101

IN REPLY REFER TO:
Environmental Quality

MEMORANDUM

TO: Director, U.S. Geological Survey

FROM: Office of the Area Director

SUBJECT: Review of Draft Environmental Statement, Proposed Surface Coal Mining Operation, Big Sky Mine, Peabody Coal Company, Rosebud County, Montana (DES 78/51)

We have been requested by our Central Office to review the subject and provide comments to you by February 5. In accordance with our review we wish to submit the following:

1. Our prime concerns in evaluating this proposal are the adverse impacts to the Northern Cheyenne Indian Reservation. The EIS states that negligible adverse impacts will occur on the reservation due to an increase of workers. The EIS also states that changes in air quality on the reservation will be negligible. We do suggest that the mining plan be modified to include substantial monitoring of air quality near the northern boundary of the reservation. It is likely that multiple areas of coal development may adversely affect the Class 1 air quality designation on the reservation.

2. Page II-11 states the reservation is 12 miles south of the Big Sky Mine and page I-1 states the Northern Cheyenne Indian Reservation lies 10 miles south of the mine. This discrepancy should be corrected.


Area Director

1 Page III-10, third paragraph suggests that additional monitors be installed to determine the frequency of any violations downwind of the proposed expansion.

2 Page III-11, last paragraph: change "12 miles" to about 10 miles.

LETTER 6



United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW
WASHINGTON, D C 20241

February 6, 1979

DES 78-51

Memorandum

To: Director, Geological Survey
From: Director, Bureau of Mines
Subject: Draft environmental statement, Big Sky Mine, Rosebud County, Montana

This is a well-prepared statement that appears to be a complete and concise discussion of the significant issues involved with this mining plan.

- 1 We have three minor suggestions concerning the relation between coal production activities and other mineral resources. The topographic base map of the area shows gravel pits within the site in the NW1/4 sec. 26, T. 1 N., P. 41 E. (see Fig. II-3), but Section A.3. reports that clinker is the only known other commercial mineral resource besides coal in the area. If these pits actually were opened for clinker, the apparent contradiction should be clarified. Second, on page II-3, Section A.4., unless the area already has been tested by drilling, it would be better to say that no known petroleum or natural gas reserves lie beneath the lease. Finally, the remaining discussion in Section A.4., Petroleum and Natural Gas, could be more reasonably placed in Section A.5., Chapter III, on impacts, and should replace the conflicting sentence now in that section on page III-6.
- 2
- 3

We appreciate the opportunity to review this statement.

Ryan Mark
Director

- 1 The base map is from a USGS topographic quadrangle and should have been relabeled. The gravel pits within the permit area are clinker.
- 2 Page II-3(A)(4) second line: Insert "no known..."
- 3 Comment noted. Replace sentence on page III-6(A)(5) with sentence from page II-3.



LETTER 7



United States Department of the Interior
BUREAU OF RECLAMATION
Upper Missouri Region
P.O. Box 2553
Billings, Montana 59103

IN REPLY
REFER TO UM-415

Memorandum

To: Director, Geological Survey, Reston, Virginia

From: Regional Director, Bureau of Reclamation,
Billings, Montana

Subject: Draft Environmental Statement, Proposed Surface Coal
Mining Operation, Big Sky Mine, Peabody Coal Company,
Rosebud County, Montana (DES-78-51)

1 The proposed expansion of Peabody Coal Company's Big Sky mine should have no effect on Bureau of Reclamation projects. Thank you for the opportunity to comment on this Draft Environmental Statement.

1 Thank you for your comment.

E. R. Wilde

E. R. Wilde

LETTER 8



**UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE**

Billings Area Office
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101

January 25, 1979

IN REPLY REFER TO:

ES

Director
U.S. Geological Survey
National Center, Mail Stop 108
Reston, VA 22092

Dear Sir:

The following constitute the comments from the Fish and Wildlife Service regarding the Draft Environmental Statement pertaining to the Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana.

1 Thank you for your comments.

1 (1) Page II-42, item 9. While the Bald Eagle is officially listed as an endangered species, merely its presence as a "migrant" does not require a formal Section 7 consultation with the Fish and Wildlife Service. For non-Federal projects requiring Federal approval (permits, licenses, technical assistance, grants, loans or loan guarantees) the Federal agency authorizing or approving the project must determine whether the activity "may affect" the listed species or its habitat. If a "may affect" determination is made, formal consultation is required. If a "no affect" determination is made, no formal consultation is required. Informal consultation with the FWS may be appropriate to assist in the "may affect" or "no affect" determination.

The Endangered Species Act Amendments of 1978 (P.L. 95-632) Section 7 (c) recently signed on November 10, 1978, by President Carter also states that for each Federal construction project for which no contract had been entered into and for which no construction had begun before November 10, 1978, Federal agencies shall request information from the Regional Director on whether any threatened or endangered species which are listed or proposed to be listed may be present in the area of the proposed action. If the Fish and Wildlife Service responds that there are no such listed or proposed species in the area of the proposed construction project, no further reply would be necessary. However, if the Service responds that there may be such species present, the Federal agency is required to conduct a Biological Assessment for the purpose of identifying any endangered or threatened species which are likely to be affected by the construction project. The Federal agency then has 180 days to complete the assessment unless there is a mutually agreed upon time extension.

Until the assessment is completed, no contract for construction may be entered into nor can construction begin. The conclusions drawn from the Biological Assessment will determine whether Section 7 (a) consultation shall be required. If the Federal agency determines from the Biological Assessment that none of the listed species are likely to be affected by the proposed project, Section 7(a) consultation is not necessary unless the Fish and Wildlife Service disagrees with the conclusions and requests the Federal agency to initiate consultation. If it is determined by the Biological Assessment that the proposed project may affect any listed species or if the Service requests Section 7 consultation, a Federal agency may not make any irreversible or irretrievable commitment of resources once consultation has been initiated, if such a commitment would have the effect of foreclosing efforts to avoid the adverse impacts on the species or their critical habitat.

If a 'may affect' determination is expected to occur, this could be outlined in Section III where there is no treatment of endangered species.

Also, in Section III, it could be pointed out that if impacts to golden eagles are anticipated, consultation and permits are required under the Bald Eagle Act as amended.

2 (2) While impacts upon domestic livestock may be similar to that which may occur to wildlife ungulate species, impacts on domestic livestock should not be discussed in the wildlife section of the E.S. unless a correlation is being attempted. **2** Your suggestions are noted.

If impacts to domestic livestock are to be discussed, we suggest that they be included in the Sociology section under Ranches.

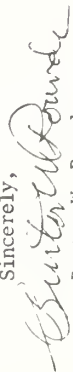
3 (3) The proposed reclamation section does not appear adequate for fish and wildlife. Topography will be of a gentle rolling slope and will lack the topographical relief necessary for wildlife species. **3** The reclamation plan has been revised as described in chapter I of this volume.

Vegetation selected for replanting is heavily laden with wheatgrass species. I suggest pubescent and crested wheatgrasses be eliminated from the seed mixture as well as smooth brome.

Skunkbrush sumac does not do well when planted from seed and requires special soil conditions as well. I suggest the reclamation section of the mine plan as well as the EIS be revised to reflect needed revision prior to submission of the final E.S.

Should you or members of your staff have any questions regarding these comments, please contact Mr. Raymond Hoem (FIS 585-6750) of my staff.

Sincerely,


Burton W. Rounds
Area Manager

cc: Harold Tyus, RAL, Denver, CO
Glenn T. Malmburg, Federal Task Force Leader, Box 1135, Billings, MT
Gary Wood, Field Supervisor, ES, Billings, MT
FIS/OEC, Washington D.C. ATTN Noreen Clough

LETTER 9



United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE
WASHINGTON, D. C. 20240

IN REPLY REFER TO:
DES 78-51

Memorandum

To: Director, U.S. Geological Survey

From: Director, Heritage Conservation and Recreation Service

Subject: Draft Environmental Statement, Proposed Surface Coal Mining Operation, Big Sky Mine, Peabody Coal Company, Rosebud County, Montana

Historic and archeological resources have not been adequately addressed in the draft statement. Thirty-four archeological sites have been identified within the proposed permit area and vicinity by two different surveys. However, "a review of these data have shown that additional survey must be completed to adequately cover the area of the proposed mine extension" (II-66). In order to properly evaluate the extent of the resources and the adequacy of investigation, the following additional information is needed:

1. The survey methodology employed (surface vs. subsurface testing; sampling vs. nonsampling procedures; etc.);
2. The locations of surveyed areas and non-surveyed areas; and
3. The relative densities of archeological resources in relation to the proposed construction and mining areas included in the expansion (withholding actual site locations).

According to section 106 of the National Historic Preservation Act of 1966 (P.L. 89-665), as amended, Federal agencies must take into account the effect of any undertaking on properties included or eligible for inclusion in the National Register (emphasis added). Although we are assured on page II-66 that there will be compliance with Advisory Council procedures, we believe the accompanying stipulation that "in compliance with Executive Order 11593 and State Policy, the company must meet the requirements of the Montana State Historic Preservation Officer for a cultural resources clearance" (I-23) is not sufficient. There is no mention of specific testing

- 1 Compliance with Section 106 of the 1966 Historical Preservation Act and Executive Order 11593 and the Advisory Council's "Procedures for the Protection of Historic and Cultural Resource Properties (36 CFR 800) have been initiated by the Bureau of Land Management and the Office of Surface Mining. Inventory evaluation and data recovery are being monitored by OSM, ACHP, the Montana SHPO, and the Montana Department of State Lands. Please contact one of these agencies on any aspect of the 106 process.
- 2 The survey of the entire permit area (permit area as defined in chapter I of the draft statement) and a buffer zone will be completed during the summer of 1979.
- 3 The relative densities of the archeological resources is unknown. The densities will be determined at the completion of the survey.
- 4 Specific testing programs are being undertaken by the company to determine National Register eligibility of sites identified.

LETTER 9

programs, as recommended by the SHPO in his letter of July 18, 1978, (p. XI-53), in order to determine National Register eligibility of at least nine known sites.

- 5 The full extent of possible impacts and appropriate mitigation measures, including avoidance and preservation (the possibility of which is not discussed in the draft statement), cannot be determined until the identification and evaluation processes are complete.

Handwritten: I would like to see for
Chris Therral Delaporte
by 5/1/81

- 5 The full extent of possible impacts and appropriate mitigation measures cannot be determined until the identification and evaluation processes are complete. The evaluation will be completed this fall (1979), following completion of the survey mentioned above.

LETTER 10



United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO

L7621 (RMR)PC

Memorandum

To: Director, Geological Survey
ACTING CHIEF
From: Director
Subject: Draft Environmental Statement, Proposed Surface Coal Mining
Operation, Big Sky Mine, Peabody Coal Company, Rosebud County,
Montana (DES 78-51)

1 We have reviewed the subject statement as requested in your memorandum
of December 14, 1978, and since no units administered by the National
Park Service will be affected, we offer no comment.

1

Thank you for your comment.

LETTER II

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
4015 Wilson Boulevard
Arlington, Virginia 22203



Dr. H. William Menard
Director, U. S. Geological Survey
National Center, Mail Stop 108
Reston, Virginia 22092

Dear Dr. Menard:

In response to Dr. Balsley's letter of December 14, 1978, we have only a few general comments concerning your draft environmental statement on the proposed expansion of mining and reclamation at the Big Sky mine, Rosebud County, Montana.

Inasmuch as the proposed plan calls for expanding and extending the present operations, the information and analyses provided by the statement seem fairly adequate and detailed in scope. Currently, our inspection and enforcement program for this area should not be affected, other than to require us to perform additional inspection activities when the proposed expansion plan gets started.

We thank you for giving us this opportunity to comment on your statement.

Sincerely,

Robert B. Lagather
Robert B. Lagather
Assistant Secretary for
Mine Safety and Health

Thank you for your comment.

LETTER 12



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80203

Ref: 8W0

Mr. J. R. Balsley
Director, U.S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Mr. Balsley:

1 We have completed our review of the draft environmental impact statement for the "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana." Our two major comments on the EIS and the action proposed are:

1. As reported in the draft EIS, the Peabody Coal Company must apply for a Prevention of Significant Deterioration (PSD) permit as outlined in Federal regulations (40 CFR 26388, June 19, 1978). These regulations require the application of Best Available Control Technology (BACT) for all sources of fugitive and non-fugitive particulate emission sources at proposed coal mine operations. However, the Colstrip area has been designated a "non-attainment area" under the terms of the Clean Air Act of 1977. A "non-attainment area" is one in which primary air quality standards are currently being violated. In Colstrip's situation, the standard being violated is that for particulate matter.

The State of Montana is currently developing a State Implementation Plan (SIP) which must provide for a plan of action to bring the Colstrip area into compliance with standards. Until such a SIP is approved by the EPA, a source applying for a pre-construction permit after July 1, 1979 which causes or contributes to a violation of standards cannot be permitted. An approvable SIP will require that any sources which impact in an actual area of non-attainment apply Lowest Achievable Emission Rates (LAER). These LAER's may be more stringent than BACT, though for coal mines they more than likely will be very similar. The State of Montana will also in the SIP choose whether to provide for new growth in its demonstration of attainment or whether to require "offsets" whereby new sources which would cause or contribute to a violation of standards are not permitted to construct unless there are offsetting reductions equal to the proposed emissions from the new source. New sources which will impact in an actual area of non-attainment and which have applied for a new source permit prior to July 1, 1979 will be treated under the offset policy.

1 Your concerns and comments have been noted. The company is revising their mine and reclamation plan and will not receive a permit until all requirements are met.

LETTER 12

2

The proposed Big Sky Mine as described in the draft EIS would not meet the PSD requirements for BACT. Furthermore, no ambient air quality analysis was performed. Though we reserve our final conclusions on this subject pending our review of an application for a PSD permit and compliance with an approved State SIP, it appears that the present mining plan is unsatisfactory.

2. The sediment control aspect of the reclamation plan does not appear to meet State or Federal requirements. We agree with conclusions presented in the draft EIS that the reclamation plan proposed by Peabody Coal would probably lead to an unnecessarily high level of erosion and sedimentation. In our opinion, compliance with Federal Office of Surface Mining and Montana Department of State Lands requirements (as presented in Appendix F of the draft EIS) would more effectively control potential water quality problems from the mine.

According to EPA's rating system for draft environmental impact statements, the Big Sky Mine EIS is rated EU-1 (environmentally unsatisfactory-sufficient information). The EU rating refers to the fact that the proposed mining plan does not meet State or Federal requirements related to air quality and reclamation.

We will be happy to review a revised mining plan which meets applicable regulations. If you have any questions, please contact Gene Taylor of our Montana Office, Helena, Montana, at FIS 585-5486.

Sincerely yours,



Alan Merson
Regional Administrator

LETTER 13



**STATE OF MONTANA
DEPARTMENT OF AGRICULTURE**

PESTICIDE DIVISION
AIRPORT WAY BUILDING WEST
1300 CEDAR STREET
HELENA, MONTANA 59601
TELEPHONE 406-449-3730

THOMAS L. JUDGE
GOVERNOR

W. GORDON MCOMBER
DIRECTOR

January 14, 1979

Director
US Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Sir:

In response to my review of the DES entitled "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana, I would like to submit the following comments.

- 1 Since the health and longevity of domestic livestock, as well as wildlife, may be adversely affected by dust contamination, all available technology available for dust suppression should be utilized if mining is to be allowed.
- 2 Although the depressions frequently discussed in the DES may represent a potential wildlife habitat, I feel the detrimental effects to livestock may outweigh beneficial effects to wildlife. Reclamation efforts should be directed to elimination of these depressions or to making them livestock safe.
- 3 At present approximately 47% of the proposed expansion is comprised of native grasslands. The DES points out the obvious loss of AUM's while mining is in progress but neglects to indicate the long-term effects of reclamation in terms of AUM's. With the advent of mining and the subsequent loss of Ponderosa pine and shrub species, the percentage of grassland will increase, as well as the AUM's, once reclamation has been accomplished.

Thank you for the opportunity to comment.

Sincerely,

Greg Pallister
Environmental Management Division
Montana Department of Agriculture
Helena, Mt 59601

- 1 BACT, which is not necessarily all technology available, will be employed when it is defined by EPA and the Montana Department of Health and Environmental Sciences.
- 2 The revised plan submitted by the company eliminates the major depressions.
- 3 Data are insufficient to indicate long-term effects in terms of AUM's. Most likely, the AUM's would range from 50 percent less to 50 percent more than at present, depending in part on the postmining land management (page III-17, DES).

STATE OF MONTANA



DEPARTMENT OF

FISH AND GAME

Helena, MT 59601
December 28, 1978

Director
U. S. Geological Survey
National Center, Mail Stop 108
Reston, Virginia 22092

Re: Proposed expansion of mining and reclamation plan,
Big Sky Mine, Rosebud County, Montana

Dear Sir:

After having completed a review of the wildlife and vegetation sections of the draft EIS, I have concluded that it is one of the better documents that I have seen, particularly the section on impacts. Specific comments are as follows:

- 1 Since only a small portion of the wildlife data for the area are available, a statement as to where these additional data can be found should be included.
- 2 On page III-18, paragraph A, of the Impact Section, the inference is made that if certain procedures are followed, "...snowberry and chokecherry should be easily reestablished." While I hope that this is true, a statement such as this should be supported with a literature citation since, to my knowledge, success at reestablishing these species is not commonplace.
- 3 The conclusions presented in the Impact Section lead one to believe that the requirements of the Montana State Reclamation Act cannot be met. If this is so, such perhaps the mining plan should be altered to avoid destruction of types such as rock outcrops and ponderosa pine.

Thank you for the opportunity to review the EIS.

Sincerely,

Robert R. Martinka

Robert R. Martinka, Chief
Bureau of Baseline Studies
Ecological Services Division

RRM/sd

cc: Glenn Malmberg
Environmental Quality Council

- 1 Additional wildlife data for the area are available in the mine and reclamation permit application on file at the Montana Department of State Lands, 1625 Eleventh Ave., Helena, Montana, and at the Area Mining Supervisor's Office, 3 Seventh Ave. W., Billings, Montana 59103.
- 2 Plummer, A. Perry, 1977, Revegetation of disturbed intermountain area sites, in Reclamation and use of disturbed land in the Southwest, John L. Thames, ed., University of Arizona Press.
- 3 Since snowberry and chokecherry commonly grow in moist drainages, reestablishment of moist drainages should enhance the reestablishment of these shrubs.
- 3 The mine plan has been altered.

LETTER 15



Department of Health and Environmental Sciences
STATE OF MONTANA HELENA MONTANA 59601
 ENVIRONMENTAL SCIENCES DIVISION
 Board of Health Building
 (406) 449-3946

A. C. Knight M.D., M.P.H.
 Director

February 9, 1979

U.S. Geological Survey
 Attention: Director
 National Center
 Mail Stop 108
 Reston, VA 22092

Dear Sir:

The Department of Health and Environmental Sciences (DHES) reviewed the draft environmental impact statement (EIS) for the proposed expansion of the Big Sky Mine in Rosebud County, Montana. Bob Braico, Water Quality Bureau, had the following comments:

- 1 Discussion of effluent limitations on page III-3 is incomplete. There is no suspended solids limit for water resulting from precipitation events greater than a 10-year, 24-hour storm.
- 2 The draft EIS notes the reclamation surface is improperly designed and unacceptable erosion and sediment deposition could result (Chapter III). From this and the discussion of available administrative alternatives (Chapter VIII), I presume a revised plan acceptable to the U.S. Geological Survey and the Department of State Lands will be proposed. DHES should support the revised plan if it believes best land management practices are being applied.

Thank you for the opportunity to comment on the EIS.

Sincerely,

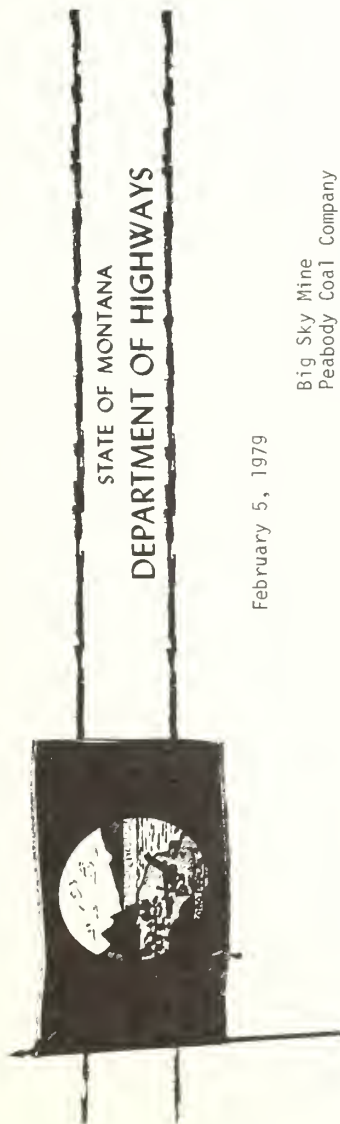

 Thomas M. Ellenhoff,
 Technical Writer

TME/rac

cc: B. Wake
 B. Braico

- 1 Page III-2 last paragraph: After first sentence: For greater storm events, there is no suspended solids limit. State and Federal mining regulations (ARM 26-2.10(10)S-10261 et seq.; 30 CFR 715.17(A)) place similar limitations upon effluent waters.
- 2 Peabody Coal Company has submitted a revised mine plan that is analyzed in chapter I of this volume.

EEO/AFFIRMATIVE ACTION AGENCY



STATE OF MONTANA

DEPARTMENT OF HIGHWAYS

February 5, 1979

Big Sky Mine
Peabody Coal Company
Rosebud County, Montana
Federal Lease M 15965

Director
U.S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Sir:

The proposed Big Sky Mine will not have a significant impact on the State Highway System by itself. What we are concerned about is the additive impact to the Decker - Colstrip area and points east by increased coal hauling, particularly the blocking of rural railroad/highway crossings. These crossings usually are the only crossings within miles and do not allow alternate routes for emergency vehicles.

In the event that the cumulative mine/train traffic increases to the point that a grade separation or other improvements are required, then any costs above what is normally allocated for construction and maintenance will be the responsibility of the coal company.

The Lame Deer - Colstrip road has recently been upgraded and widened to 26 foot width including a grade separation.

Very truly yours,

33-SCK/LJI/js

cc D. S. Johnson
Environmental Unit

Stephen C. Kologi
Stephen C. Kologi, P. E., Chief
Preconstruction Bureau

Page II-63 (L): Insert, between second and third sentence, This road has been upgraded and widened to a 26-foot width and includes a grade separation.

LETTER 17



January 23, 1979

The Director
U.S. Geological Survey
National Center, Mail Stop 108
Reston, VA 22092

RE: Draft EIS, Big Sky
Mine, Rosebud Co., MT

Dear Sir:

Thank you for the opportunity to comment on the mining and reclamation plan for the above project. Cultural resources have been identified for the area of the proposed mine, and additional survey is anticipated to identify cultural resources for the proposed mine extension. Properties which may be listed in or eligible for listing in the National Register must be considered.

At this time the draft plan does not properly address the archaeological and historical resources according to the requirements of section 106 of the Historic Preservation Act and the procedures outlined in 36CFR800. My office staff and I will be happy to assist you so that the requirements can be met.

Sincerely,

Ken Korte
State Historic Preservation Officer

KK:PB:pb

See the response to the Advisory Council on Historic Preservation (letter 1).

BURLINGTON NORTHERN

JOHN H. HERTOG
Senior Vice President — Operations

176 East Fifth Street
St. Paul, Minnesota 55101

Director
U. S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

February 2, 1979

Re: DES 78-51 Proposed Expansion of Mining and Reclamation
Plan, Big Sky Mine, Rosebud County, Montana

Dear Sir:

Burlington Northern Inc. submits the following comments on the Draft Environmental Statement (DES) for the Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana.

Fugitive Coal Dust From Unit Train Operations

The subject DES grossly overstates fugitive coal dust emissions resulting from unit coal train operations. The amount of these emissions is forecast by this DES to be somewhere within a range of 0.1 percent to 0.42 percent by weight of coal transported between Big Sky and Cohasset, Minnesota (DES, page III-11).

Coal dust losses from properly loaded coal cars is minimal. We have studied the coal dust situation in a number of ways including scale measurements and high volume sampling. The scale measurement studies showed no measurable loss of coal.

Results from high volume samplers installed adjacent to our northern coal route mainline showed that coal dust was less than 1.0% of the total particulate collected on the filters. Particulate collected includes materials such as pollen and other organic materials, sand particles blown by the wind, insects, industrial pollution, and so on. We concluded that the effect of unit coal trains on the ambient air quality was insignificant.

For these reasons and the fact that no coal dust is seen along our right-of-way even where snow-covered, we believe the loss of coal from our coal cars is extremely small. We also believe that the losses have no effect on the particulate concentration

Fugitive dust from unit trains: The Malco environmental study was only a 2-day exercise, trains were only moving at 12-15 miles/hour, and only 10 out of 70 trains were loaded coal trains. Furthermore, the distance travelled before these trains passed the experimental monitors was not defined. Paulson and others (1976) specified that most of the loss occurs within the first 50 miles of transit.

Scale measurements are useless unless weights are controlled for changes in moisture. Scale measurements of coal dust loss from the Peabody Coal Company were requested. Steve Vordeman (oral commun., 10-10-78) noted that they had recorded a mean loss of 2 percent, but that a t-test revealed that the mean was not significant.

Coal dust off unit trains has been reported as a significant public nuisance (Guarnachelli, 1977). The nuisance as well as the potential for significant coal dust loss is seasonal, since erodibility of coal is greatest during the summer months (Guarnachelli, 1977). Residential property values adjacent to railroads may be decreased (Poon, 1978). The biological toxicity of western coal dust to living organisms has not been investigated. Preliminary studies from other areas and different coals suggest that inhibition of fruiting and induced leaf necrosis on broad-leaved fruit trees may occur (Rao, 1971). Excessive coal dust deposition may cause necrosis of spruce needles or death of the trees (Auclair, 1976). Extracts from western Canadian coal proved to be nontoxic to fish even at high concentrations (Guarnachelli, 1977).

LETTER 18

Director -2- February 2, 1979
U. S. Geological Survey

1 of the ambient air. We do not know the true value of any emission factor except that it is far less than 0.4 percent and probably is much less than 0.05 percent. Because fugitive coal dust from unit trains is negligible, this has not been a concern in unit coal train operations.

It is our understanding from telephone conversations with the author of this portion of the DES that the estimated range for fugitive coal dust will be changed from 0.1 to 0.42 percent to 0.002 to 0.4 percent. This is a large range,* the upper end of which we feel is considerably too high.

2 Locomotive Fuel Combustion

The emissions predicted by the DES resulting from combustion of locomotive fuel in unit train service are also greatly in excess of probable emission levels. The source for emission factors cited in the DES is URS, Coal Train Assessment, Final Report: December 15, 1976, page V-16. We have discussed this material with the author of the air emission section of the URS report who indicated to us that he drew heavily from the Draft Environmental Impact Statement for Development of Coal Resources in the Eastern Powder River Coal Basin of Wyoming (1974) prepared by the Bureau of Land Management, U. S. Forest Service, U. S. Geological Service and the Interstate Commerce Commission. In particular the author used Table 6, page II-40 in Volume III of the Eastern Powder River Basin DES as the foundation for his work. A copy of this page is attached for your reference.

3 We have found two major errors in this DES table. Table 6 of the Eastern Powder River Basin DES uses the Environmental Protection Agency ("EPA") average locomotive emission factors from the EPA report Compilation of Air Pollutant Emission Factors, EPA Bulletin No. 42 published in 1972. These emission factors differ substantially from current factors provided to us by the manufacturer of the locomotive model most likely to be used in unit coal train service. Since this EPA Bulletin No. 42 was written, locomotive performance has been improved to significantly limit gaseous emissions.

The error of greatest magnitude is caused by the fuel consumption rate used in Table 6 of the DES for the Eastern Powder River Basin. Emissions are calculated based on a round-trip fuel consumption of 4860 gallons. The round-trip mileage is

* Estimated 1977 emissions would vary from 5 to 9200 tons.

2 Locomotive fuel combustion: Thank you for your estimates. Before the DES was finished locomotive fuel combustion rates were requested from Burlington Northern. Davies (letter 9-20-78) said that:

"We cannot determine the amount of diesel fuel used per unit train mile because of the variables. Consumption varies by age of engine, horsepower, etc. BN has considerable variance of horsepower and age of units."

3 Emissions for locomotive fuel should be changed in appendix D-5 as follows:

NO _x	-----	29.66 tons/year
CO ^x	-----	3.94 tons/year
HC	-----	1.16 tons/year

The 1,334 gallons of fuel used for a round trip from the mine converts to 9,324 pounds of fuel, not 4,673 pounds.

Emissions for the entire trip to Cohasset, one way, would approximate the original numbers used in appendix D-5.

LETTER 18

Director
U. S. Geological Survey

-3- February 2, 1979

3

unspecified but presumably is twice the length of the proposed rail line, or 226 miles. We assume fuel consumption was computed by the method given on page II-39 of the DES (also attached), i.e., by multiplying the number of locomotives (5) by peak fuel consumption (152 gallons per hour) by the assumed duration of the trip (4.3 hours). The result thus obtained is 3268 gallons per round-trip, a different amount than the 4680 gallons used in emission calculations.

The author of the URS study divided the emissions (lb. per trip) from the Eastern Powder River Basin DES by the mileage of the trip to obtain pounds of emission per mile per trip. (See Table 6. Calculation: 121 lbs. per trip divided by 113 miles equals 1.07 lbs. per mile per trip.) At this point errors in the Table 6 emission amounts are doubled because the round-trip mileage is 226 miles, not 113 miles.

The inaccuracies in the original study (Table 6) were incorporated into the URS report and compounded. The Big Sky DES in turn adopted the URS value of 1.07 pounds of particulate per trip without correction in Appendices D-1 and D-3, pages XI-10 and XI-12, respectively.

No source is given for the gaseous emission tonnages cited in Appendix D-5, page XI-14, and on page III-13 as attributable to unit train operations. We know the tonnages are several times more than the probable emission levels but cannot demonstrate errors without knowledge of the calculation method.

Because of its reliance on the Powder River DES, the Big Sky DES emission tonnages and factors are all based on factors derived from nationwide statistics (see attached page II-39 of Eastern Powder River Basin DES). Computer modelling of the specific track segments and estimation of the duty cycle under study results in a more accurate estimate of emissions.

As a result of computer modelling which incorporated factors related to the specific track segments and duty cycle, we estimate the maximum fuel consumption to be 1334 gallons for the round-trip from Forsythe, Montana to the Big Sky Mine and back. (This is the same distance used in computing regional emissions impact in the Big Sky DES). The duty cycle was estimated based on tonnage, speed restriction and grade. The emission factors for the locomotive model most likely to be used for this service were obtained from the locomotive manufacturer and are listed below:

LETTER 18

Director -4- February 2, 1979
U. S. Geological Survey

3

NO _x	33.33 gm/lb. fuel
CO	4.43 gm/lb. fuel
HC	1.31 gm/lb. fuel
SO _x	not available from manufacturer

Fuel consumption for the round-trip is calculated to be 4,673 pounds. (Average fuel specific gravity is 0.841.) Thus, emissions for 420 round-trip trains per year would be computed as follows:

$$\left(\frac{420 \text{ trips}}{\text{year}} \right) \left(\frac{4673 \text{ lb. fuel}}{\text{trip}} \right) \left(\frac{\text{pollutant gms}}{\text{lb. fuel}} \right) \left(\frac{1 \text{ lb.}}{2200 \text{ gms}} \right) \left(\frac{1 \text{ ton}}{2000 \text{ lbs.}} \right)$$

The following table compares gaseous emission amounts attributable to combustion of locomotive fuel as computed above to the amounts given in Appendix D-5, page XI-14 of the DES.

	Revised Figures	Appendix D-5
NO _x	29.8 tons/yr.	295.5 tons/yr.
CO	4.0 tons/yr.	104.1 tons/yr.
HC	1.2 tons/yr.	75.0 tons/yr.

We urge you to carefully review all emission and fugitive dust estimates resulting from unit coal train operations.

4 Other Impacts From Unit Coal Trains

It is asserted on page II-64 of the DES that unit coal trains "frequently impede road-vehicle access between areas for extended periods (in excess of 5 minutes)." This characterization of the impact of an average of 1.1 coal trains per day (0.55 one way) is unfairly harsh and vague. Unit coal trains usually travel about 45 miles per hour which would block a crossing for only 90 seconds. The impact of one train a day will be minimal in the sparsely populated territory through which it operates.

5 For the sake of accuracy we point out that the train lengths and car loads in unit trains from this mine have averaged 105 cars, each loaded to 99 tons, rather than 100 cars of 100 tons each as stated on page II-64 and elsewhere.

Respectfully submitted,


J. H. Herford
Senior Vice President-Operations

Attachments

4 Other impacts: Most crossings would indeed be blocked for only 90 seconds. However, other crossings, such as those in Colstrip, are known to be blocked for extended periods by unit trains. At rail crossings within a community, this could be particularly critical in terms of the passage of emergency vehicles.

5 Page II-64(3d par.), first sentence: change parenthetical phrase to 105 cars of 99 tons each.

VOLUME III
PARTS II and III

COAL



COAL



COAL



COAL



COAL



COAL



COAL



**DRAFT
ENVIRONMENTAL
IMPACT STATEMENT**

SITE ANALYSIS

BN/CNW RAILROAD - ARCO MINE

Development of Coal Resources
in the
EASTERN POWDER RIVER COAL BASIN
of Wyoming

COAL

BLM - USFS - USGS - ICC

LETTER 18

traffic. Some livestock and wildlife collisions with trains would also be expected to occur.

Unit train emissions

Exhaust emissions from diesel locomotives may be extensive in the vicinity of the railroad. The following information as to exhaust stack emissions from an assumed typical unit train containing 5 locomotives of 3,000 horsepower (HP) and 110 cars are contained in Table 6. The fuel consumption for a 3,000 HP diesel locomotive is 5.0 gal/hr at idle and 152 gal/hr at full load.

More detailed information is available for various and different types of locomotives; however, EPA average locomotive emission factors based on nationwide statistics, were used to calculate emissions per unit train. Diesel engine manufacturers are engaged in research and development programs to reduce both visible emissions and exhaust gas contaminants on current and future production engines and developing retrofit components for existing engines.

Table 6

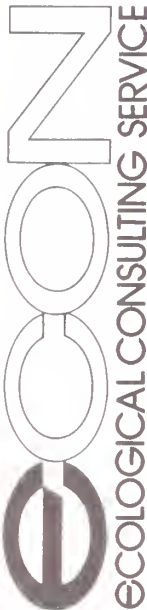
Average Locomotive
Emissions Per Unit Train

	Average Locomotive,* Emission Factors		Average Locomotive Emissions,** Per Unit Train/Per Round Trip	
	Lb/10 ³ gal.		Lb/Per Trip	
Particulates	25		121	
Sulfur Oxides (SO _x as SO ₂)	57		277	
Carbon Monoxide	130		633	
Hydrocarbons	94		457	
Nitrogen Oxides (NO _x as NO ₂)	370		1801	
Alcleyhdes (as HC HO)	5.5		27	
Organic Acid	7		34	

* Assumes train of 110 cars and 5 locomotives at 3,000 HP

** Assumes round trip of 4.3 hours with one-half the distance empty and one-half loaded.

Source: U. S. Environmental Protection Agency, Office of Air and Water Programs, Office of Air Quality Planning and Standards Research; Compilation of Air Pollutant Emission Factors, EPA Bulletin No. 42



ECON INC.
Airport Way Building West
1300 Block, Cedar Street
Helena, Montana 59601
Telephone
406/442-4650

January 19, 1979

Director
U.S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Sir:

We wish to comment on certain aspects of the "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana." Our comments are:

- 1 The Summary (page iii), 3.B contains a highly speculative statement containing some ambiguities. Studies on the above-ground productivity of reclamation three to five years old at Big Sky Mine show that above-ground biomass weight per acre is much greater than the surrounding unmined areas. Thus, while species diversity might be lower, productivity, in terms of biomass, is higher.

1 Page iii(3)(B): Comment noted, insert for the long term after "reestablished."
- 2 3.D is also highly speculative. A relatively small amount of wildlife habitat would indeed be altered, but alteration of the total existing wildlife diversity is a complex consideration. The more monotypic a site is, generally the fewer species will be found there. In practical terms this would probably mean fewer songbird species on reclamation the first few years. At the same time, however, small mammal data from the Big Sky Mine (and other mines) suggests a substantial increase in small mammals, which in turn attracts certain species of raptors and predators. In the overall wildlife context of the Big Sky Mine control area, total wildlife diversity would be unlikely to change to any significant degree. As an example, in the reclaimed areas where Peabody was allowed to leave depressions, resulting in small water bodies, several puddle duck species now use the ponds and nest in the reclamation, which has added to the wildlife diversity of the Big Sky Mine control area.

2 Page iii(3)(D): Comment noted, change "would" to may.
- 3 The statements (3.B and 3.D) express typical legitimate concerns, but we feel the existing data at Big Sky Mine shows that the degree of pessimism implied in the above-mentioned statements is unfounded.

3 Page iii(3)(B) & (D): The analysis was based on long-term look at impacts not just the short-term (3-5 yrs.) artificial situation during reclamation.
- 4 On page II-36 paragraph 3 under 1. Grassland, saying that dense stands of yucca occur in the western wheatgrass subtypes, is questionable. Vegetative data from Big Sky Mine indicates yucca is more likely to be found in the prairie sandreed grass subtype (sandy sites), rather than in the western wheatgrass subtype.

4 Page II-36(1)(3d par.): Remove the word "dense." At end of paragraph add: The yucca is present only in some areas having shallow soil inclusions that make the range site a shallow-sandy complex.

LETTER 19

Director
U.S. Geological Survey
Page 2
January 19, 1979

- 5 Also on page II-36 under 2. Scrub, the second paragraph should be clarified regarding skunkbush sumac. Skunkbush sumac is an important browse species for mule deer in summer and fall. It is not an important winter browse species on the Big Sky Mine control area.
 - 6 On page II-38 under 1. Mule Deer, 1.6 deer should be changed to 2.2 deer in 1974. The 1978 approximate minimum mule deer density (ECON 1978)¹ was calculated at 3.1 mule deer per square mile, which is the highest estimate so far for the Big Sky Mine. The 1978 mule deer fawn:doe ratio was 122:100, which is classed as excellent (Eustace 1971)² and the highest mule deer productivity ever observed on the Big Sky Mine or other nearby areas.
 - 7 On page II-38 under 2. Antelope, there is no data to even suggest that antelope migrate across the Big Sky Mine. During spring and summer some antelope move onto portions of the Big Sky Mine and move off again in the fall and do not typically winter on the Big Sky Mine. The Big Sky Mine control area is marginal antelope habitat because among other things it lacks extensive big sage areas. The important distinction is that the Big Sky Mine is not in a migration route or path.
 - 8 On page II-40 under 4. Raptors, the statement is made that prairie falcon nests are probably located on the permit area among the rock outcrops shown in Figure II-15. This is incorrect. Those outcrops were examined closely and no prairie falcon nests were found there in 1978. A prairie falcon nest was found across the highway approximately one mile east of the Big Sky Mine permit area in an outcrop immediately adjacent to another mining company's reclamation.
 - 9 On page II-40 under 5. Upland Game Birds, the sharp-tailed grouse estimates were 2.3 per square mile in 1976--not 2.5 as stated. In 1978 the estimate was 7.2 sharptails per square mile (ECON 1978)¹.
 - 10 On page II-42 the statement is made that ponderosa pine is a preferred habitat for Hungarian partridge. There is no data suggesting huns prefer ponderosa pine. More observations of huns have been made in reclamation areas in the Colstrip vicinity than in other habitat types. The literature (Kirsch et al. 1973)³ suggests reclamation may increase hun habitat.
 - 11 On page II-42 it states western meadowlarks are common year-round residents of Big Sky Mine. They are not. In the winter they are not found on the Big Sky Mine.
 - 12 Pages III-17 through III-20 in their entirety are speculation unsupported for the most part by any available data. We have observed ducks and sharptails nesting in reclamation, deer fawning in
- 5 Page II-36(2): Comment noted.
 - 6 Page II-38(1): Change 1.6 to 2.2 as suggested. Change 3.0 to 3.1 mule deer per square mile. Insert after "species" for mule deer in summer and fall. 1978 figures were not available at the time of publication.
 - 7 Page II-38(2): Omit 3d sentence and change the word "migrating" to moving in 2d sentence.
 - 8 Page II-40(4): Department of State Lands data suggested otherwise; the 1978 data were not available at the time of publication.
 - 9 Page II-40(5)5: Change 2.5 to 2.3 as suggested. ECON's 1978 data wasn't available at the time of publication.
 - 10 Page II-42: Omit last three words in 3d paragraph.
 - 11 Page II-42(6): Omit "western meadowlarks" from 3d sentence.
 - 12 Page III-17 through III-20: In paragraph 4 change the last clause to .. and the tolerance of certain species for microenvironmental change varies.

Director
U.S. Geological Survey
Page 3
January 19, 1979

- 12 reclamation, huns using it extensively, and so on. Saying that "species tolerant of environmental conditions could become established" is stating the obvious. What should have been stated is that the tolerance of certain species for micro environmental change varies. The use of the word "weeds" is too vague. "Weeds" could be forbs useful to wildlife--dandelion and salsify, for example. The idea of a "wave of plant succession" is again a vague expression. Very few green ash or boxelder exist on the Big Sky Mine, which minimizes the significance of establishing them on reclamation. As far as mine-caused dust wearing down the teeth of wildlife, we have been unable to find any literature showing dust on vegetation is causing this sort of problem around mines, farms, or naturally barren areas. We feel pages III-17 through III-20 should be rewritten more dispassionately and more closely allied to what the immense amount of data actually shows.
- 13 On page III-21, as mentioned previously, no data suggests that there are any specific antelope migration routes across Big Sky Mine.
- 14 On page III-21 under 3. White-tailed Deer, it implies there are whitetails on the Big Sky Mine. In fact none have ever been observed on the Big Sky Mine control area, although they are numerous along Rosebud Creek.
- 15 On page III-21 under 4. Small Mammals, it is stated that cottontail rabbits would be reduced because of lack of escape cover. This is speculative. Reclamation might provide denser cover than presently available. It should also be noted that catches of small mammals such as deer mice and voles are usually lowest in the ponderosa pine type and highest in reclamation.
- 16 On Page III-22 it states that some raptor hunting would be precluded due to loss of some ponderosa pine habitat. Although some use of the ponderosa pine might be made for nesting or perching, the data indicate the raptors utilize the more open areas for their hunting.
- 17 On page III-22 there is a prediction that the breeding activity of sharp-tailed grouse would be reduced. It is unlikely it will change because of mining. At a nearby mine sharptails have established new leks immediately adjacent to reclamation, in which they nest, brood, and roost extensively (ECON unpublished).
- Also, as previously noted, Hungarian partridge are not a numerous species in the Colstrip area. However, the most frequent observations made of huns are in reclamation.
- 18 On page VIII-13 under 6. Seeding 2., the recommendation is made to "plant more species required for winter range of mule deer." This

- 12 In paragraphs 4 and 5, change "weeds" to annual forbs. In paragraph 5, drop phrase "and weedy species" from first sentence. It is much simpler and clearer to say a "wave of plant succession" than to say "invading species from undisturbed areas would colonize the oldest reclaimed first. Then they would gradually colonize the second oldest, third oldest, etc. until at some point in the future the entire area were colonized." Page III-18 change "green ash to box elder" to moist drainages. Lack of data does not indicate lack of impact.
- 13 Page III-21(2): Omit 1st sentence. In second sentence, insert antelope after "preferred."
- 14 Page III-21(3): Omit 2d sentence.
- 15 Page III-21(4): Comment noted. See response to Peabody; letter 21, response 116. Rock outcrops and ponderosa pine are not part of the reclamation plan; therefore, cottontail escape cover would be reduced.
- 16 Page III-22 Comment noted.
- 17 Page III-22 Comment noted.
- 18 Page VIII-13(2)(b): Delete second alternative.

Director
U.S. Geological Survey
Page 4
January 19, 1979

18 is a general statement that is generally appealing. However, in the Big Sky Mine control area mule deer are most often observed in winter using the ponderosa pine-grassland and the closely associated skunkbush-grassland. Looking at the mule deer winter observations plotted for the Big Sky Mine over a several-year period shows that mule deer are seldom, if ever, seen in winter on the permit area. Thus, planting more deer winter food species on this particular permit area would not necessarily mean the plants would be utilized by deer in winter.

19 On page VIII-13 under 6. Wildlife. Tree and shrub species planting should be highly location-specific, since "wildlife" encompasses dozens of species on the Big Sky Mine and each species have demonstrable habitat preferences, to some degree, from season to season.

Game management areas in a mine control area are unlikely to be effective. To manage game one must be able to influence the harvest, and only the Montana Fish and Game Commission has the statutory authority to set seasons, bag limits, and so forth. Small areas, such as might be created on a mine site, would not be large enough to provide the four-season requirements for many game species. Game species are highly mobile, and to provide all the needs of all the species present one would have to have more land than is available. The most practical wildlife management on mining areas is accomplished by the reclamation plan, which by legal necessity requires shaping the land to its approximate original contours and drainage and establishing vegetation of a species mix quite similar to what previously existed. The habitat "niches" thus provided will quickly be found and filled by those species common to the area and those kinds of niches.

Human activity in areas not being mined is relatively low on mine control areas we are familiar with, and is primarily related to research of one kind or another.

Variances for certain highwall retention and water bodies are an excellent idea for the specific benefit of certain wildlife species and tie in with the following sentence recommending judicious creation of "artificial" raptor nesting site potential, which is a practical and effective method of enhancing habitat for some species.

A typical fence that will control cattle (3 or 4 strands) does not impede antelope nor deer. It is unlikely that a mine in this area would construct sheep or hog-tight fences, unless a neighboring land owner was running sheep.

Rock outcrops, in the context of the Big Sky Mine control area are not unique, and in the general area are very common. Allowing mines

19 Page VIII-13(6): - Comments noted. Insert selected between "on" and "revegetated" in first sentence.

LETTER 19

Director
U.S. Geological Survey
Page 5
January 19, 1979

19 to do some specific creative highwalling would mitigate to a very large extent the loss of rock outcrops, including the ones on the Big Sky Mine permit area.

20 On page XI-66 the comments in III. Vegetation Study are moot, as in the summer of 1978 the entire permit area was mapped in detail and extensively sampled.

In summary, we appreciate the opportunity to comment on the "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana" Draft Environmental Statement, and have tried to do so in an impersonal, constructive manner. We appreciate also the problems of assimilating and summarizing huge amounts of data into an environmental statement, and hope that our comments provide additional insight into the wildlife relationships on the Big Sky Mine. Our comments were formulated by William F. Schwarzkoph, M.S., Robert L. Eng, Ph.D., and me.

Sincerely,

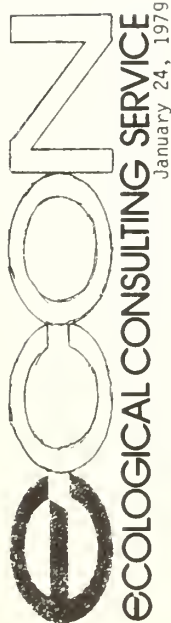


Robert E. Carroll
Vice President and General Manager

REC:lh

20 Page XI-66 This was not available at the time of publication. Add footnote to 1st paragraph: The entire study area was extensively sampled during the summer of 1978 and mapped in detail.

¹ECON INC. 1978. *Peabody Coal Company Big Sky Mine Wildlife and Wildlife Habitat Monitoring Study*, 1978. 42 pp.
²Eustace, C. D. 1971. *Big Game Survey and Inventory (Deer)*. Mont. Fish and Game Dept. Job Prog. Rept., Proj. No. W-130-R-2, Job No. 1-7. 20 pp.
³Kirsch, L. M., At. T. Klett and H. W. Miller. 1973. *Land Use and Prairie Grouse Population Relationships in North Dakota*. J. Wildl. Mgmt. Vol. 37, No. 4:449-453.



ECON INC.
Airport Way Building West
1300 Block Cedar Street
Helena, Montana 59601
Telephone
406.442-4650

Director
U.S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Sir:

We have the following comments on air quality, as discussed in the "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana."

1 Page II-19 - 2nd paragraph - "Fugitive dust is inadequately monitored and poorly understood": As a general statement, that is true for everyone. However, the air quality monitoring program at the Big Sky Mine has always been and will probably continue to be more elaborate and extensive than the legal requirements. The monitoring network was set up in September 1974, well ahead of any official request by state or national agencies for such information. The program has been continuously updated since that time in an effort to stay ahead of any future monitoring requirements.

2 Page II-19 - 3rd paragraph: It's clear from the text and the footnotes that probably none of the data in the table is pertinent to the particulate size distribution in the vicinity of the Big Sky Mine. Even though no sizing data is currently available for the Big Sky Mine, it would be better to say so and go on than to discuss data which probably doesn't apply.

3 Page II-22 - 4th paragraph: The air quality monitoring network now consists of five high volume air samplers. A fifth sampler was set up in the vicinity of the coal loadout tipple in September 1978.

4 Page II-22 - 5th paragraph: The text ignores the improvement in air quality at the mine over the last few years. Although production has remained about the same, annual geometric means for TSP have been decreasing over the past three years. The 1978 data shows yet another drop in annual geometric means of TSP for 1978.

5 Page II-26 - 1st paragraph and Figure II-10: Why was the National secondary standard for daily TSP used instead of the primary standard? The text states that Figure II-10 shows the frequency with which TSP 24-hour averages were above the level which protects human health. The standard which applies in the case of human health is the National primary standard of 260 $\mu\text{g}/\text{M}^3$ --not the secondary

1 Page II-19(2d par.): The statement "Fugitive dust is inadequately monitored and poorly understood" is general and applies to all fugitive dust sources in eastern Montana including the Big Sky mine. The monitoring network at the mine is confined to the leasehold boundaries, does not, as such, represent "ambient air," and therefore is hardly more extensive than the legal requirements. The data gathered at the mine indicate only minesite air pollution but nothing about the downwind particulate concentrations, which would have enabled any fugitive dust problem to be better addressed. The air monitoring system at the Big Sky mine would be more useful for regulating dust concentrations to which workers at the mine, especially at the mine office, are exposed.

2 Page II-19(3d par.): NEPA requires that all potential impacts be assessed regardless of the extent of scientific support. The crux of the particulate problem lies in the particle-size distribution, not with the weight of particles measured in a high-volume air sampler. Small particles may become lodged in the lungs of people and animals or in the stomatal pores of plant foliage, disrupting gaseous exchange. The former may cause respiratory irritation or disease in humans and animals, the latter may increase water loss from plants during periods of low relative humidity (Perera and Ahmed, 1978; Ricks and Williams, 1974). For these reasons it is important to begin to point out apparent particle-size distribution in the vicinity of strip mines with all the proper qualifiers. The University of Wyoming (1977) has followed a fugitive dust plume from the Colstrip mines and has found that the particle-size distribution is similar to background, but that the concentrations of all sizes are much higher. This includes submicron particles capable of altering weather patterns.

3 Page II-22(4th par.): Data from monitors set up after the text of the draft EIS was written could not be included in the document. The new data were received on March 28, 1979, much too late for incorporation into the draft analysis, released in December 1978.

4 Page II-22(5th par.): From the data available it is too early to conclude that the fugitive dust problem at the mine has improved. If the last of three numbers is the first to indicate a decrease, it does not indicate a significant, long-term trend. The 2 years of complete data for the annual geometric mean recognized by the State and Federal Government (from January to December, not October to September), as is graphed in the draft EIS, do show a decrease in 1977 over 1976. This could be due to changes in climate rather than particulate control at the mine: 2 years of data are not enough to define a trend.

LETTER 20

Director
U.S. Geological Survey
Page 2
January 24, 1979

5 standard which is designed to protect property, the environment, and public welfare. Excursions over the primary standard have been far fewer (20 instead of the 47 listed for the period 1975-78). In 1978 monitoring results showed only two excursions over the primary standard (once each at two of the sampling sites) which is allowable within the standard. In 1978 the Big Sky Mine was in compliance with the federal annual and 24-hour primary standards for TSP.

6 Page XI-9 - Appendix C-1: The figure for the January average precipitation during 1941-50 is listed as 9.09 inches instead of 0.77 inches.

These comments were formulated by John A. Coefield, B.S., Meteorologist, of our staff.

Sincerely,

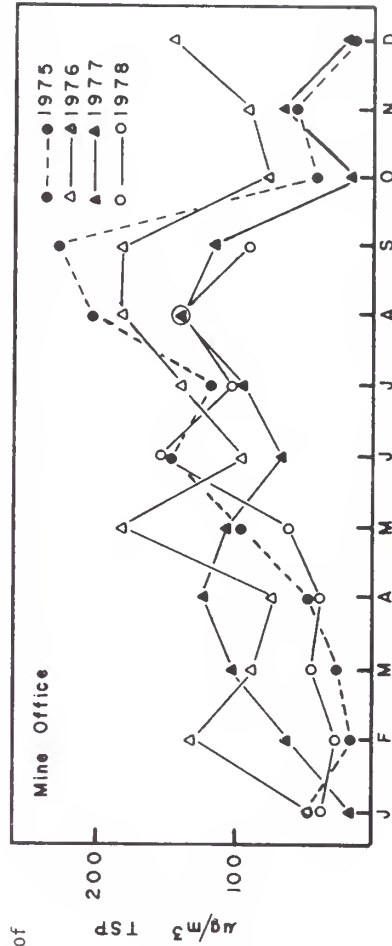


Robert E. Carroll
Vice President and General Manager

REC:lh

4 The following figure shows mean monthly TSP for all 4 years of data collection. Note that a decrease in 1978 data does not occur during every month of the year and the 150 $\mu\text{g}/\text{m}^3$ secondary national ambient standard was violated in June 1978.

5 Page II-26(1st par.): change text to read: "Figure II-10 shows the average 24-hour concentration of TSP in the permit area. Recorded 24-hour TSP averages violated National Ambient Air Quality Standards (primary, 250 $\mu\text{g}/\text{m}^3$, and secondary, 150 $\mu\text{g}/\text{m}^3$).".



6 Page XI-9(appendix C-1): Change number as indicated.

PEABODY COAL COMPANY

ROCKY MOUNTAIN DIVISION

CAMPUS 6 OFFICE SUITE 600 12015 EAST 46TH AVENUE • DENVER, COLORADO 80239

(303) 371-7990

January 29, 1979

Director
United States Geological Survey
108 National Center
Reston, Virginia 22092

Mr. Leo Berry, Jr., Commissioner
Montana Department of State Lands
State of Montana
Helena, Montana 59601

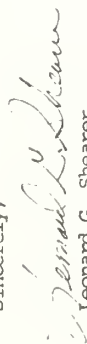
Gentlemen:

The Engineering Department of Peabody Coal Company's Rocky Mountain Division, comprised of Engineering, Environmental, and Reclamation people, has reviewed the Draft Environmental Impact Statement covering the "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana". The staff respectfully submits the attached comments regarding the dEIS.

The purpose of submitting the attached comments is to clarify certain points brought out in the dEIS that may well be misunderstood and/or misinterpreted. Peabody personnel believes that complete understanding of the EIS is essential for proper evaluation of the proposed project.

Thank you for your consideration of Peabody's comments concerning the dEIS.

Sincerely,


Leonard G. Shearer
Director of Engineering

LGS:jp

Attachments

LETTER 21

page 1

PEABODY COAL COMPANY - ROCKY MOUNTAIN DIVISION

Comments on the "Proposed Expansion of Mining and Reclamation Plan"
Big Sky Mine, Rosebud County, Montana

SUMMARY

- 1 Page iii #2 - There are no expansions projected for the plant, loading facilities, access road, and rail spur. Haul roads are to be extended as needed in the normal mining progression, not expanded.
 - 2 Page iii #3(A) - This statement is very misleading. The vegetation, soil and overburden will be removed from a total 894 acres, but in small increments over a period of five (plus) years. With our present reclamation program, only 50 to 60 acres are left disturbed during any time period. Disturbed means not graded, not topsoiled, and not seeded.
 - 3 Page iii #3(B) - Studies on the reclamation which is three to five years old, have shown that production of graze (grasses, legumes, etc.) is several times greater in mass than the graze produced in the virgin areas.
 - 4 Page iii #3(C) - states, "Existing local aquifers would be destroyed; the returned spoils, where saturated, would contain water of poor quality unsuitable for domestic or livestock use." It should be clarified to indicate that in isolated areas, local aquifers would be disturbed and that water quality may contain poor quality water unsuitable for domestic and livestock use.
 - 5 Page iii #3(D) - states, "Wildlife habitat would be altered and wildlife diversity would be reduced." In all previously submitted annual wildlife reports, wildlife diversity has not been decreased. This is supported by the 1977-1978 data provided by ECON.
 - 6 Page iii #3(E) - Best available control technology has not been defined for the Big Sky Mine. The definition is made on a "case-by-case" basis by the EPA and the applicant and not by the EIS author. Dust emissions would not increased by 100%. The estimate of 5,445 tons per year of dust emissions is grossly exaggerated. The air quality section of this EIS does not address the subject of this EIS, that is the "Proposed Expansion..."
- Apparently no modelling has been done on the proposed expansion dust emissions and no evidence is given that air quality standards will be exceeded or where.
- No data has been presented on present visibility in the area or how much, if any, it would decrease due to the mine expansion.

- 1 Page iii(2): Revise second sentence to read: The company proposes to expand their present mining operation. No new facilities are proposed; however, haul roads would be extended as needed in the normal mining progression.
- 2 Page iii(3)(A): Add: incrementally over a 7-year period to the end of the sentence.
- 3 Page iii(3)(B): Change "reestablished" to: sustained.
- 4 Page iii(3)(C): Revise sentence to read: The mined part of the aquifer would be destroyed; the returned spoils, where saturated, would contain water of poor quality unsuitable for domestic use and probably unsuitable for livestock use.
- 5 Page iii(3)(D): Change "would be reduced" to could possibly be reduced.
- 6 Page iii(3)(E): Comment noted. Change: "best available control technology" to: best technology currently available. See response for page 11-22 (D)(2)(a)(3) and page 111-10 (D)(1); these are comments 45, 79, and 80.

LETTER 21

page 2

SUMMARY (con't)

- 6 BACT has not been defined thus, no control efficiencies can be attributed to its application.
- 7 Page iii #3(G) - is a little misleading. It states, "1,264 acres of land would be temporarily removed from range, recreation, and wildlife uses during mining and reclamation." All 1,264 acres are not scheduled to be mined, and of the 894 acres scheduled to be mined, only increments of about 150 acres will be "removed from range, recreation, and wildlife uses". The question is, what recreation has been observed on the property prior to mining; and, it has also been demonstrated that wildlife uses have not been preempted during mining and reclamation programs. In fact, based on recent studies of the past year, wildlife has increased within the immediate area of the mine.
- 8 Page iii #3(H) - states, "There may be an increase in surface water runoff, and a reduction in both surface and ground water quality." To date, surface water runoff has not increased and surface water quality has not been decreased as a result of mining. In isolated areas within the spoils, ground water quality has been degraded. However, it is not conclusive that the ground water degradation will have long-term adverse effects.
- 9 Page iv #3(I) - This statement is misleading without a breakdown of the known thirty-four (34) cultural resource sites and their value.
- Chapter I
- 10 Page I-3 #2 - Streambed construction and runoff retention. The Army Corps of Engineers has no jurisdiction in the mining area because of the 5 CFS limitation.
- 11 (Permits & Agencies) states that the Big Sky Mine needs a permit from both the U.S.G.S. and O.S.M. This is misleading - O.S.M. and the U.S.G.S. approve a mine and reclamation plan. In addition, Peabody is not required to file a permit application with the Army Corps of Engineers.
- 12 Page I-4 (C) - The statement, "The proposed action was to mine in Section 22, Township 1 North, Range 41 East; however, the entire leasehold was discussed" is misleading, the studies, and FES 74-12, were meant to cover all of mining Area "A". However, permission to mine only Section 22 was granted.
- 13 Page I-7, 8, 9 - Figures I-3, I-4, I-5 - the legend is incorrect, the dark line boundary as shown is not the boundary of the mine plan, but a property control line.

- 7 Page iii(3)(G): Change "1,246" to 894; Insert: in increments of about 150 acres after "removed."
- 8 Page iii(3)(H): Comment noted.
- 9 Page iv(3)(I): The breakdown of known sites is presented in chapter II of the draft (volume I). A complete evaluation of all sites is the responsibility of the Advisory Council on Historic Preservation, the Bureau of Land Management, the State Historic Preservation Officer, and the Office of Surface Mining. A complete evaluation cannot be made until a survey of the entire permit area has been completed by Peabody Coal Company.
- 10 Page I-3(2): Comment noted. In column headed "Agency" delete: "Army Corps of Engineers" and "U.S. Geological Survey."
- 11 Comment noted; if OSM and USGS do not approve the mine and reclamation plan, the company will not mine according to the proposed plan. Delete footnote.
- 12 Page I-4(C): Change "mine in sec. 22" to mine in area "A" (fig. I-6). Add Permission to mine in section 22, T. 1 N., R. 41 E. was granted following this EIS.
- 13 Pages I-7, I-8, I-9: Substitute property control line for "mine plan" in legend of all three figures.

Chapter I (cont)

- 14 Page I-11 (E)(1) - The dam, constructed for sediment control, described in this section was constructed in June, 1977.
- 15 Page I-13 (E), Figure 7 - The loop track is located too far north on the map. The loop track does not cross Emile Coulee as shown on this and subsequent figures.
- 16 Page I-15, first paragraph - states, "Ground water intercepted by the mining operation would be pumped out of the mine pit and used for dust suppression on haul roads and irrigation of reclaimed land." Peabody Coal Company is not proposing irrigation of reclaimed land. Peabody believes that irrigation is not a practicable method for restoration of vegetation.
- 17 Page I-15 (5)(b) - There are no "coal storage silos".
- 18 Page I-16, Figure I-9 - Present stockpile is incorrectly located, should be shown on western border of Section 23.
- 19 Page I-19 (G)(2) - The 90-day time period pertains only to topsoil taken from topsoil stockpiles as stated in the Montana Rules and Regulations, specifically, 26-2.10(10)S10340 - Topsoiling, Subpart (5).
- 20 Page I-21 (H)(1)(b) - Regarding the Migratory Bird Treaty Act. Reference to this particular Act is irrelevant to coal mining operations. The Act was passed to protect migratory birds which may be impacted by large industrial facilities; not in regard to mining.
- 21 Page I-22 (H)(1)(c) - At the time this EIS was written, Best Available Control Technology (BACT) was not defined and is not defined except on a case-by-case basis. The potential dust control measures are included in the list given. These, however, are determined by the EPA and the applicant and cannot be determined in advance. Presently, proposed BACT measures are policies (Region VIII) only and not statutory or regulatory in nature.
- 22 Page I-22 (H)(1)(d) - The Big Sky Mine is considered as a "major stationary source" by certain agencies. This definition is being contested by the mining industry on the grounds, among others, that a surface is by no means stationary.
- 23 Page I-23 (H)(2)(a) - The sentence, "Existing access roads and facilities must be used throughout the life of the mine expansion." This should be changed to state, "Existing access roads and facilities will be used throughout the life of the mine expansion, unless Peabody requests, and receives, approval from the Department of State Lands for changes."
- 14 Page I-11(E)(1): Exhibit "R-3", submitted by Peabody Coal Company on November 20, 1978, in their revised mine application, indicates that dam No. 10 would be built in the location described, overlapping into SE1/4 SW1/4 of sec. 14. Revise the second sentence of this paragraph to read: Plans for the construction of a similar dam, already built on Emile Coulee, are presented in figure I-8.
- 15 Page I-14(E), figure 8: Delete from the title the word "proposed."
- 16 Page I-13(E) figures I-7, I-10, II-3, and II-15: Change location of north end of rail loop.
- 17 Page I-15, first full paragraph, first sentence: delete "and irrigation of reclaimed lands."
- 18 Page I-15(5)(b): Change "storage silos" to storage area.
- 19 Page I-16(fig. I-9): Relocate stockpile to western border of section 23.
- 20 Page I-19(G)(2): Comment noted.
- 21 Page I-21(H)(1)(b): The Migratory Bird Act applies to this mine.
- 22 Page I-22(H)(1)(c): Comment noted. Insert in first sentence: on a case-by-case basis between the words "review" and "to." Third sentence: Substitute: Potential dust control measures may include, for: "Thus the mining plan and the agency's approval should use."
- 23 Page I-22(H)(1)(d): Comment noted. Whether the Big Sky mine is stationary or mobile is not the subject of this document and does not change the nonattainment area classification.
- 24 Page I-23(H)(2)(a): Change "must" to would. We recognize that variances may be granted at the discretion of the appropriate agency.

LFTTER 21

page 4

Chapter 1 (con't)

24 Page I-23 (H)(2)(e) - states, "Clinker must be placed at the discharge points..." It should be stated, or restated, that appropriate materials, as approved by the Department of State Lands, must be placed at the discharge points of outlet pipes of the settling ponds, as necessary.

25 Page I-23 (H)(3)(a) - This particular statement allows no variances from the 100 foot buffer zone. The EIS team should not recommend, in our estimation, 100 foot buffer zones which may be contrary to the Department of State Lands' variance process.

26 Page I-24 (H)(3)(c) - states, "The company may be required to mine more of the McKay coal in two excluded areas...under the Coal Conservation Act..." It has already been determined by the Department of State Lands that one of these particular areas cannot be mined as a result of implementing Section 9 of the Montana regulations (the Sandstone outcrop is a potential raptor habitat). Therefore, this particular mitigation measure should not be included in this section. The Department of State Lands' policy states that the Coal Conservation Act does not have standing when considering environmental matters.

27 Page I-24 (H)(4)(c) - It should be added to the end of the statement, the following, "...unless Peabody requests, and receives, approval from the Department of State Lands for a variance to this 'requirement'."

28 Page I-25 (H)(4)(i) - The Department of State Lands has always taken the stand that terracing is conducive to excess erosion and thus will not be allowed.

29 Page I-25 (H)(4)(j) - Cover crop species and seeding rates are always submitted to and approved by the Department of State Lands before implementing.

Chapter II

30 Page II-1 (A)(1)(2nd pp) - states, "The landscape (both hillslopes and stream channels) is in balance with runoff and natural erosion rates." This statement is incorrect. The landscape is never in balance with runoff and natural erosion rates.

31 Page II-1 (A)(2)(1st pp) - The McKay Coal is not considered "low sulphur". In fact, Western Energy Mine, a few miles distant, cannot sell this seam because of its high sulphur content.

32 Page II-3 (A)(2)(2nd pp) - Armells Creek is several miles from the permit area.

24 Page I-23(H)(2)(e): Insert after "clinker": or other material as approved by the Department of State Lands and OSM. To the end of the sentence add: as necessary.

25 Page I-23(H)(3)(a): This statement is not meant to be a recommendation of the EIS; rather, it is meant to be a paraphrasing of the regulations. See response 23.

26 Page I-24(H)(3)(c): Comment noted. Until the Department of State Lands makes a determination, there is always the possibility for requiring a more extensive recovery of coal reserves. Insert one of the between "in" and "two."

27 Page I-24(H)(4)(c): Change as indicated. See response 23.

28 Page I-25(H)(4)(i): Comment noted. However, it is allowed in the law. Delete this statement.

29 Page I-25(H)(4)(j): Peabody has misconstrued the intent of this section of the statement. Refer to response 25.

30 Page II-1(A)(1)(2d par.): Peabody's analysis is incorrect. The concept of equilibrium, i.e., a landform is shaped by the balance between the forces of erosion (mainly runoff) and the resistance of the surface to erosion (determined by vegetative cover as well as soil and rock characteristics), is fundamental to modern geomorphology. This does not mean that erosion does not occur, only that it occurs at natural rates.

Chapter II (cont)

- 33 Page II-3 (A)(2)(4th pp) - states, "Overburden traits that exceed State suspect levels are discussed in detail in Appendix A. In summary, excessive concentrations of cadmium, molybdenum and nickel were found in the strata throughout the lease area." The state suspect levels have never been technically demonstrated to be toxic or hazardous to existing vegetation within the State of Montana. In many cases, especially in eastern Montana, natural conditions exhibit metal concentrations in excess of state suspect levels. Peabody recommends that the Department of State Lands conduct research to determine suspect levels of trace metals that are toxic to plants. It is common knowledge that many of the trace metals found in clays and shales are due to ionic bonding and are not mobile. Trace elements in many strata are not available for plant uptake and are, therefore, inert and immobile within this environment. To place arbitrary limits to restrict disturbance and placement of material spoils is without adequate technical justification.
- 34 Page II-5, Table II-1 - The suspect levels are confusing. Peabody takes issue with the suspect levels of cadmium, lead, molybdenum, nickel, and nitrate. The nitrate level is only related to the drinking water standards and does not indicate toxic levels of nitrate in soils. Peabody has recently submitted a report on molybdenum and copper and it appears that molybdenum toxicity problems do not exist in southeast Montana.
- 35 Page II-6 (B)(b) - "Mining is being conducted in Section 22, Township 1 North, Range 41 East. This impoundment is in a final cut of earlier operations." Must be re-written, there is no impoundment in Section 22, Township 1 North, Range 41 East.
- 36 Page II-10 (B)(2)(c)(2nd pp) - "However, magnesium tends to be higher in concentration than calcium or sodium in most of the samples." This statement is meaningless without specific concentrations and without a statement on significance as to whether it is toxic or potentially hazardous to health.
- 37 Page II-11 (B)(2)(c)(3rd pp) - states, "Pumpage from the mine at this time was as much as 1 million gallons per day." It should be stated that maximum pumpage is 1 million gallons per day when extended over periods of less than one week at any one time. Also, "Most of this water was discharged into the old mine pit to the south in SW 1/4 Sec. 27 where it was lost by evaporation and downward seepage." It should be noted that this particular water impoundment is being used beneficially for wildlife habitat and stockwatering purposes. Thus, the impoundment is serving a beneficial use. In addition, the impoundment is considered as biologically viable.
- 38 Page II-13 (C)(2) - The most characteristic precipitation data for the Big Sky Mine would be data from the mine itself, not Colstrip. Colstrip has a longer record but not more characteristic.
- 31 Page II-1(A)(2)(1st par.): Low and high are relative terms. The McKay coal is high in sulfur in comparison to the Rosebud; however, it is low in sulfur relative to a number of coal seams mined elsewhere, particularly in the East.
- 32 Page II-3(A)(2)(2d par.): Revise sentence to read:
Sedimentary beds in the northwest part of the permit area dip less than one degree northwesterly toward Armwells Creek. In the southeast part of the permit area, sedimentary beds dip to the southeast.
- 33 Page II-3(A)(2)(4th par.): State suspect levels are guidelines derived from existing literature. They represent the best information available at present, and will be refined and updated as additional data are published. The relationships between extractable levels of various elements, plant absorption, and toxicity are extremely complex. This is especially true in drastically disturbed ecosystems in which replaced overburden and soils materials are in nonequilibrium situations causing alterations of spoils and soils. Any interested party may suggest changes in published suspect levels supporting any such suggestions with citations from published literature.
- The methods used to determine trace metal concentrations for comparison with State suspect levels are designed to determine plant available concentrations and do not report total concentrations.
- 34 Page II-5, table II-1: Comment noted. It is true that molybdenum toxicity problems do not currently exist in southeastern Montana. However, the potential for future development of the problem does exist, and this should be monitored.
- 35 Page II-6(B)(1)(b): The impoundment is in section 27.
- 36 Page II-10(B)(2)(c)(2d par.): The statement was only meant to indicate that magnesium is the dominant cation. Chapter II is a description of the existing environment. The water quality is described, not the interpretation of the significance of any particular dissolved constituent. The sentence referred to here is merely an amplification of the preceding sentence.
- 37 Page II-11(B)(3)(c)(3d par.): The beneficial use and the biologic viability of the impoundment in section 27 have not been demonstrated.
- 38 Page II-13(C)(2): Insert: Long-term before "precipitation data most characteristic of the Big Sky mine area * * *."

Chapter II (cont)

39 The statement, "Such large precipitation events seem to occur after extended periods of dryness.", means nothing. Because it did not rain today, does not mean it will rain tomorrow.

40 Page II-17 (D)(1) - "The Colstrip area designation is based on company data showing significant violations for both the annual standard (annual mean $107 \mu\text{g}/\text{m}^3$) and 24-hour standard (high value = 428; second high value = 379). The state station in the area does not show violations but these data do not represent the mining activity as the sampler is on top of a hill several hundred feet above the mining. This site was chosen to reflect power plant emissions, rather than low level sources. Area boundaries include the mine and surrounding areas as shown in Figure 10." This statement was made in "Designation of Attainment, Nonattainment Areas for the State of Montana. The designation was based on "company" data and not Peabody's Big Sky Mine data.

41 Page II-19 (D)(1) - states, "A fraction of the particulate emissions associated with coal mining in the permit area may include small particles which travel great distances for extended periods of time and those in the respirable range." This statement does not make sense. Also, "Trace elements found in overburden and coal dust are among those which at low concentrations are toxic to living organisms." Everything is toxic at certain concentrations. At what level are "low" concentrations toxic; and, to what living organisms?

42 Page II-19 (D)(2)(a) - states, "Fugitive dust is inadequately monitored and poorly understood." Five (5) hi-vols are presently in operation at the Big Sky Mine; one of which has a particle sizing head on it. Appendix P, Page XI-80 of the EIS states, "The Department (DSL) will evaluate in consultation with the Air Quality Bureau (AQB) current monitoring sites in relation to the proposed mine site to determine if the current scheme is adequate." How can the EIS author deem the mine inadequately monitored if DSL and AQB have not decided?

43 Page II-19 (D)(2)(a)(1) - Discussion on the particle size information and comparison of data in Table II-5 is inappropriate. Footnote (7) on page II-19 states, "The Colstrip monitoring site is 275 feet above ground level and may not completely reflect surface mining impacts on particle size distribution." Footnote (b), Page II-20 states, "Particle size classes for these sites are not exactly equivalent to those from Big Horn County." Apples and oranges are being compared. If we do accept Table II-5, Rosebud County information as representative, then within the limits of accuracy for the test equipment, Colstrip and McKae's Ranch data are identical.

39 After "Such large precipitation events seem to occur," insert: during periods of above average precipitation, not during drought."

40 Page II-17(D)(1): Revise text to read: Both the Big Sky mine and the Western Energy Co. (WECO) Rosebud mine are located within the Colstrip Nonattainment Area for TSP."6

The State sampler does reflect surface mining particulates on the lower end of the size distribution. However, the nonattainment decision is based on the Montana Power Company's high-volume sampler within the town of Colstrip.

41 Page II-19(D)(1): Move "in the respirable range" to follow after "particles", and delete "and those." These are summary statements. A fraction of the particulate emissions from coal mines are of the correct size and concentration to alter cloud formation and local precipitation patterns (University of Wyoming, 1977). In the existing environment chapters we wish to point out and summarize those aspects of air pollution which pose potential impacts to the environment.

This is the mandate of all environmental impact statements. Most things are not toxic at low concentrations. Again this is a summary statement. The availability of these trace elements (listed later in the text) to most plants and animals is unknown. However, it is well known that lichens accumulate very high concentrations of trace elements and when animals ingest these trace elements they become soluble in the stomach.

42 Page II-19(D)(2)(a): The last (1978) ECON report was received on March 28, 1979, much too late to incorporate data from the 5th monitor. The 4th monitor installed has been operating for too short a time to analyze its data properly. All monitors have been placed within the mine boundary and, as such, do not indicate "ambient air" to which air quality regulations apply, and do not elicit information about air quality downwind of the minesite. The particle size data were not available when this EIS was prepared; without a particle sizing head, high volume air samplers only report the weight of large dust particles - hardly an adequate quantification of the problem. The present monitoring design at the Big Sky mine was made in conjunction with the Air Quality Bureau.

Chapter 11 (con't)

43

Thus mining has no effect on particle size distribution since, "The McKae Ranch site is 10 miles east-southeast and frequently downwind (Fig. 11-8) of Colstrip." (Footnote (7), Page 11-19).

44

Page 11-21 (D)(2)(a)(2) - Big Sky coal silica content is 10% higher than what other mines? Is 10% a great variation? Is 10% significant? One part per trillion is infinitely greater than zero parts per trillion - so what?

Table 11-6 lists trace elements which occur in "relatively high" concentrations or "moderately high" concentrations as compared to topsoil. What does Table 11-6 mean? Don't trace elements leach out of topsoil? Are these normal conditions? At what low concentrations will trace elements be toxic to what biological accumulators? This is not a description of the existing environment. This section means absolutely nothing; though it sounds like it should.

45

Page 11-22 (D)(2)(a)(3) - 5,984 tons are not the potential particulate emissions from the Big Sky Mine.

Maximum emission factors have been used to calculate potential annual emission from overburden excavation. Referring to Appendix D-1, Page XI-10 and using the same extent of activity per year:

a. Emission factor of 0.05 lbs. of dust per ton of overburden moved is for truck and shovel loading. EPA recommends the use of emission factors given in the 1978 PEDCo. Report, "Survey of Fugitive Dust from Coal Mines".

Recalculation using these factors gives:

Dragline $- \frac{8,376,000 \text{ tons/year}}{1.5 \text{ yd}^3/\text{ton}} \times 0.0265 \text{ lbs/yd}^3 = 74 \text{ tons/year}$

Overburden Drilling - Emission factor should be 1.5 lbs/hole, not 0.22 lbs/hole:

$8.13 \text{ holes} \times 1.5 \text{ lbs/hole} = 6.1 \text{ tons/year}$

Bulldozers - "Wyoming Air Quality Maintenance Area Analysis, Powder River Basin) uses 16 lbs of dust per operating hour as does the "Southeastern Montana Coal Resource AQMA Analysis".

$5 \times 16 \text{ lbs/hr} \times 6,240 \text{ hrs/yr} = 124.8 \text{ tons/yr}$

if a normal climatic control factor is included; the value is

$\frac{365 - 100}{365} \times 124.8 = 90.6 \text{ tons/yr}$

43

Page 11-19(D)(2)(a)(1): Comment noted. The particle size classes are similar enough for the Big Horn and Rosebud sites that the data can be used to give the reader an idea of how background particulates for an unmined area compare to those from a mined area.

The Colstrip and McKae Ranch data are not identical; footnote 7 (p. 11-19) explains why the data appear to be identical and demonstrates the effect of placing a monitor 275 feet above a strip mining operation and one right next to a dirt road. Obviously only something the size of a mining operation could disperse enough particles such that a monitor 275 feet above the ground would have readings similar to those from a monitor adjacent to a dirt road. If the McKae site monitor were 275 feet above the ground, your point would be valid.

Page 11-19(D)(2)(a)(2): Comment noted. See response 41.

44

Page 11-22(D)(2)(a)(3): Emission factor comments: Published emission factors for strip mining operations have been shown to be extremely variable and subject to a wide range of interpretations. EPA, Region VIII, recommends using the PEDCo, 1978 study or emission factors listed in appendix B of the Region's interim policy paper (January 1, 1979). To quote this interim paper: "The PEDCo study shows that a typical 1 million ton per year mine would create almost 3,000 tons per year (80 percent of which result from 10-mile round-trip haulage) of particulate emissions." Mean haul road length at Peabody will range from 2 to 4 miles round trip.

45

Short Haul Year

Haul roads: $3,000 (.80)(.2) = 480 \text{ tons per million tons of coal.}$

Rest of the mine: $600 + 480 = 1,080 \text{ tons per million tons of coal.}$

$(1,080) (4.2 \times 10^6 \text{ tons of coal}) = 4,536 \text{ tons of particulates per year.}$

Chapter 11 (con't)**45**

Scrapers - The two publications above used the emission factor of 16 lbs of dust per hour of operation.

$$2 \times 16 \text{ lbs/hr} \times 2,971 \text{ hours} \times 0.725 \text{ (climatic factor)} = 34.5 \text{ tons/year}$$

The sum of these reasonable emissions yield the potential emission of 205.2 tons per year for overburden excavation.

Front-end loader - The EPA recommended factor for coal loading is 0.12 lbs of dust per ton of coal loaded.

$$0.12 \text{ lbs/ton} \times 1.04 \times 10^6 \text{ tons/yr} = 62.4 \text{ tons/year}$$

Coal Drilling - The EPA factor is 0.22 lbs/hole, not 2.25 lbs/hole.

$$0.22 \text{ lbs/hole} \times 5,101 \text{ holes/year} = 1.1 \text{ tons/year}$$

Shovel/Truck Loading - The recommended EPA emission factor is 0.008 lbs of dust per ton of coal loaded.

$$0.008 \text{ lbs/ton} \times 1.26 \times 10^6 \text{ tons/year} = 5.2 \text{ tons/year}$$

The sum of these reasonable emission factors yield the potential emission of 68.7 tons per year for the coal extraction process.

Coal Hauling - Uncontrolled: $6 \times 15,027 \times 3.5 = 168.3 \text{ tons/year}$
Controlled: $6 \times 16,027 \text{ mi/yr} \times 3.5 \text{ lbs/mi} \times .5 \text{ (control)} = 84.1 \text{ tons/year}$

Grade Roads - The previously noted publications have used the emission factor of 16 lbs of dust per hour of operation. In addition, a 50% control factor is used since the grader is working on watered haul roads.

$$\begin{aligned} \text{Uncontrolled: } & 16 \text{ lbs/hr} \times 1,780 = 14.2 \text{ tons/year} \\ \text{Controlled: } & 16 \text{ lbs/hr} \times 1,780 \times .5 \text{ (control)} \\ & = 7.1 \text{ tons/year} \end{aligned}$$

The sum of these reasonable emissions yield the potential emission of 182.5 tons per year for coal hauling and controlled emissions of 91.2 tons per year.

Crushing and Screening - The emission factor of 2.0 lbs of dust per ton of material used in this EIS was for stone quarrying and crushing operations, not coal.

The EPA recommended emission factor is 0.18 lbs per ton of coal crushed. Control efficiencies for water sprays range from 50% to 95%. A conservative estimate of 50% will be used. It must

45Long Haul Year

$$600 + 960 = 1,560 \\ (1,560)(4.2) = 6,552 \text{ tons of particulates/yr.}$$

These estimates of actual emissions are not much different from the author's estimates of potential emissions from the Big Sky mine. The emission factor of 16 tons/hour for scrapers already includes 50 percent control. You have added another 50 percent in your calculations. Please note the credit that the Big Sky mine is given for present controls, under actual emissions in table 11-7, page 11-23 (volume 1).

Chapter 1 of this volume (fig. 1-4) shows a model for the Big Sky mine of particulate emissions from all sources as calibrated from both the WECO mines and the Big Sky mine.

Bulldozer emissions: Your computations appear incorrect.

Front end loaders: Using Peabody's present production rate (2.3×10^6) rather than the number Peabody uses $(1.04 \times 10^6 \text{ tons/year})$:

$$[0.12 \times (2.3 \times 10^6) = 276,000] \div 2,000 = 138 \text{ tons/year.}$$

Coal drilling:

$$[0.22 \times 5,101 = 1,122.22] \div 2,000 = 0.56 \text{ tons/year.}$$

Locomotive diesel fuel: Peabody's assumptions are incorrect. Because Montana air permit regulations specifically exempt locomotives from permitting requirements, this does not mean locomotives have ceased to emit particulates. The mandates of HEPA and NEPA require that the statement note and summarize potential impacts to the environment. The lack of a permitting requirement does not mean that an impact would not occur.

Outdoor coal storage: Add a footnote to indicate additional sources. Note: not all of the Big Sky storage is in a covered stockpile; only the crushed coal is in a covered stockpile.

Chapter II (con't)

45 be noted that the crushers at the Big Sky Mine are enclosed, thus affording even greater control.

Uncontrolled: $0.18 \text{ lbs/ton} \times 2.3 \times 10^6 = 298 \text{ tons/year}$
 Controlled: $0.18 \text{ lbs/ton} \times 2.3 \times 10^6 \times 0.5$ (50% control)
 = less than 103.5 tons per year

Coal Conveying - The EPA estimate for coal conveying is 0.2 lbs/ton and not 1.0 lbs/ton as given in the EIS. Partially covered conveyors result in a 90% reduction in potential emission. It must be noted that water sprays are used at the Big Sky conveyor end-points resulting in even greater dust control. The conveyors were originally totally enclosed; however, at the direction of the Mine Enforcement and Safety Administration (MESA) the bottom of the covers were cut out.

Uncontrolled: $0.2 \text{ lbs/ton} \times 2.3 \times 10^6 = 230 \text{ tons/year}$
 Controlled: $0.2 \text{ lbs/ton} \times 2.3 \times 10^6 \text{ tons/yr} \times .1$
 (control) = less than 23 tons per year

Thus, for coal handling the sum of these above emissions result in a potential or uncontrolled emission of 437 tons per year and controlled emissions less than 26.5 tons per year.

Powder Truck & Lube Truck - Emission factors for dust emissions in the EIS are not unreasonable.

Blasting - Emission factors for blasting in the reference cited are 25.1 lbs/blast for coal and 14.2 lbs/blast for overburden and not the 77 lbs/blast used.

Diesel Fuel Combustion - Particulates from diesel fuel combustion are included in the dust emission factors. Thus the 2.4 tons per year given in the EIS is redundant.

Gasoline Combustion - Much of the gasoline particulates are included in the dust emission factors. Also, the emission rates given do not reflect recent manufacturer exhaust emission controls. The factors used were calculated in 1969.

Locomotive Diesel Fuel - The emissions calculated in the EIS are for coal train engines under full power conditions. Coal loading at the mine is not done under full power. Additionally, Montana air permit regulations specifically exempt locomotives from permitting requirements.

45 Surface disturbed: It was previously noted by Peabody that 150 acres are disturbed, not 100. To assume no wind erosion occurs on the reclaimed surface is both unrealistic and unreasonable. A better assumption would be that 150 acres are disturbed and on the other 210 acres, reclamation has progressed sufficiently to reduce wind erosion by an unknown factor. Wind erosion is a function of surface crusting, vegetative cover, and litter build up. The reclaimed surface, for the first several years, has not returned to premining conditions relative to wind erosion rates. Some of the reclamation at the Big Sky mine approximates premining exposure, other does not. Ideally, losses due to wind erosion would be calculated similarly to sediment yield.

BACT: Comment noted.

LETTER 21

page 10

Chapter II (con't)

45

Thus, total fuel emissions are less than estimated in the EIS.

Employee Vehicles - The emission factor used is reasonable. 90% control is assumed for the use of a chemical dust suppressant at Big Sky and an additional 50% for watering.

Uncontrolled: $42 \text{ cars} \times 1,240 \text{ mi/car} \times .9$
 $= 23.4 \text{ tons/year}$

Controlled: $42 \text{ cars} \times 1,240 \text{ mi/car} \times .90 \times (.05)$
 $= 1.2 \text{ tons/year}$

Outdoor Coal Storage - The emission factor used in the EIS was calculated for the storage of aggregate and not coal. Further, the emission factor includes emissions as a result of stockpile load-in, loadout, and truck traffic around the pile and not just wind erosion, as stated in the EIS.

The EPA suggests an emission factor computed by the formula $1.6 \text{ ulbs/acre-hour}$ where u is the mean wind speed in meters per seconds (mps). (This includes bulldozer activity on and around the pile.)

If the Big Sky Mine were to use outside coal storage rather than its covered stockpile, 29,000 tons of coal piled 7 yards high would cover 2,762 square yards of area or .57 acres (1.5 tons/yd^3 , assumed).

Assuming the average wind speed is 7 miles per hour (EIS, Page 11-17), or 3.1 mps, the uncontrolled emissions from the stockpiling of coal would be:

$1.6 \times 3.1 \text{ mps} \times .57 \text{ acres} \times (24 \text{ hr/day}) (365 \text{ days/yr})$
 $\frac{2,000 \text{ lbs/ton}}{= 12.5 \text{ tons per year}}$

The EPA states that covered coal storage results in a 99% control of dust. Water sprays on coal before the coal is stored, during its storage, and during its load-out, which is done at the Big Sky Mine, further reduces the dust emission.

Controlled Emission: 12.5×0.01 (minimum control)
 $= 0.13 \text{ tons/year}$

Surface Disturbed - If no reclamation was performed, approximately 360 acres would have been disturbed. However,

Chapter II (con't)

45

reclamation and revegetation have been performed and a maximum estimated 100 acres were disturbed at any one time.

Uncontrolled: 360 acres x .54 ton/acre-yr = 194.4 ton/yr
Controlled: 100 acres x .54 ton/acre-yr = 54 ton/yr

The total potential (uncontrolled) emissions due to wind erosion are better estimated by 206.9 tons per year rather than 1,968.4 tons per year. Controlled emissions are better estimated by 54.1 tons per year rather than 549.9 tons per year.

Best available control technology has not been defined for the Big Sky Mine thus, the statement, "Current dust mitigation techniques do not use best available control technology" is incorrect.

46

The coal dust loss rate (0.001 tons/ton of coal) used in the EIS cannot be found. In no way may the information in the reference cited (Paulson, 1976) be construed to give this value. The subject of the paper was the spraying of #6 fuel oil on dried coal to reduce spontaneous ignition. Dust loss measurements were only incidental to the purpose of the project. However, if the gross measurements in the report are used, a "number" can be derived. From Figure 2 of the report; less than 150 grams of particles were trapped in the two dust collectors mounted on the 100 tons cars for the entire trip from Pekin, Ill. to Grand Forks, North Dakota. This translates to a value of 0.0000016 tons/ton of coal. It is also noted that the "dust" collectors also collected large pieces of coal, "The largest particle size of the material in the dust collector was retained on a 1/4-in. screen."

It is noted that a particle 1/4-in. in size is 210 times the size considered as "suspended particulate" (30 ug/m) and 1,260 times larger than the size considered as "respirable" (5 ug/m). It must be further noted, that the "dust collectors" also collected particles from the ambient air during the entire 800-mile trip. It is assumed the EIS author referenced the above report by mistake and did not "create" the coal train dust emission factor used.

Further considerations in spraying coal with oil include:

- Oil would have to be trucked from the nearest refinery in Billings, approximately 100 miles away.

$$4.2 \times 10^6 \text{ tons coal/year} \times 2 \text{ gal oil/ton} \\ = 8.4 \times 10^6 \text{ gal. oil/year}$$

46

Coal dust lost off unit trains: The emission factor of 0.001 ton/ton of coal was a mistake in the draft EIS. It has been empirically shown that coal dust losses off unit trains may range from a minimum of 0.0002 percent (Paulson and others, 1976) to a maximum of 0.42 percent (Nimerick and Laflin, 1977). Most of the loss has been observed to occur during the first 50 miles of transit (Paulson and others, 1976). The loss is dependent on train and wind speed (Nimerick and Laflin, 1977), season of the year (Guarnaschelli, 1977), degree of pulverization of the coal (Nimerick and Laflin, 1977; Paulson and others, 1976), and moisture content of the coal (Nimerick and Laflin, 1977). Maximum coal train speeds in the northern Powder River basin are 40 miles per hour, although the track from Colstrip to Nichols is restricted to 25 miles per hour (Davies, 1978). Assuming no additional loss from wind speeds, approximately 0.40 percent of transported coal could be lost within the first 50 miles of transit, at 40 mi/hr train speeds.

Since this estimate is based upon Eastern coal (having a 9-percent moisture content) it will be used as a maximum indicator of coal dust loss. The minimum will be reported as 0.0002 percent. High-volume air sampling has shown that train traffic may increase total suspended particulate concentration by a range of 24 to 55 $\mu\text{g}/\text{m}^3$ in the immediate vicinity (Malco Environmental Sciences, 1977). Coal train traffic was 14 percent of all traffic and represented less than 1 percent of the observed increase in particulate concentrations. The report hypothesizes that the increase in total suspended particulates is largely due to reentrainment of dust off the railroad tracks.

Annual dustfall may be computed from the calculated coal dust emissions as tons/ mi^2 along the railway corridor/year.

For example: 1985 coal dust lost: from Colstrip to 19 miles east of Forsyth, a total of 50 miles.

$$(18.5 \times 10^6 \text{ tons of coal/yr}) \times (.0004) (1/50 \text{ mi}^2) = \\ 1,480 \text{ tons/mi}^2/\text{yr}, * \text{ maximum estimate.}$$

*Assume most of the coal dust settles out within 1/2 mile of either side of the railway corridor.

Coal trains: Selective disregard of particles of coal dust greater than 30 micrometers would present a biased analysis of unit-train losses. Nimerick and Laflin's (1977) estimates are probably understated in that they only sampled the coal dust, and did not collect all coal dust lost in transit.

47

Chapter II (con't)

page 12

47

$$\frac{8.4 \times 10^6 \text{ gals/year} \times 200 \text{ mi/truck load} = 2.4 \times 10^5 \text{ mi/yr}}{7000 \text{ gals/truckload}}$$

Using EIS particulate emission factors (Page XI-10)

$$\frac{2.4 \times 10^5 \text{ mi/yr} \times .91 \text{ gm/mi} = 0.24 \text{ tons/yr}}{200 \text{ lbs/ton} \quad (454 \text{ gms/lb})}$$

results in 0.24 tons of particulate in transporting the oil to the mine. Additionally, 190 lbs of sulfur oxides would be emitted.

- b. Because #6 fuel oil suggested by the EIS authors' reference (Paulson, L. E., S. A. Cooley, C. Wegert and R. C. Ellman, 1976) is very thick at room temperature, it must be heated to 175°-200° so it can be sprayed. This would result in the need to construct special insulated and heated storage tanks. This would necessitate a heater that would burn coal or #6 fuel oil, resulting in additional unknown quantities of sulfur oxides, particulates, carbon monoxide, etc.

- c. At the elevated temperatures needed to spray the oil, at least 7% of the oil will vaporize, resulting in the emission of 2,352 tons of hydrocarbons per year.

$$\frac{8.4 \times 10^6 \text{ gal/yr} \times 8 \text{ lbs/gal} \times 0.07}{2000 \text{ lbs/ton}} = 2,352 \text{ tons/yr}$$

- d. #6 fuel oil from the Billings refinery often exceeds 5% in sulfur content. When burned at the power plant this would result in increased potential emissions of 3,360 tons of sulfur oxides per year and 33.6 tons of particulate.

$$\frac{8.4 \times 10^6 \text{ gals/yr} \times 8 \text{ lbs/gal} \times 0.05 \times 2(S_2 \text{ to } SO_2)}{2000 \text{ lbs/ton}} = 3,360 \text{ tons/year } SO_2$$

$$= \frac{8.4 \times 10^6 \text{ gals/yr} \times 8 \text{ lbs/1000 gal}}{2000 \text{ lbs/ton}}$$

$$= 33.6 \text{ tons/year particulate}$$

- e. The cost of "coal spray oil" from the Conoco refinery at Billings is approximately \$0.40 per gallon plus \$0.05 per gallon shipping. This results in a cost increase of approximately \$0.90 per ton of coal (2 gal/ton) for oil and shipping only.

47

Oil sprays: Alternatives other than fuel oil are available; it is possible to reduce emissions from coal trains. It usually takes very little fuel to maintain the temperatures of the hot oil. Rather, the problem is often one of getting the oil cool enough to use.

It is assumed Peabody has calculated uncontrolled emissions of sulfur. Controlled emissions would be less and there would be an increase in Btu's per pound. Spraying all the coal reduces the particulate emissions at future transfer points. Peabody could also consider spraying only the exposed surface in each coal car, thus reducing costs.

Peabody's costs indicate that the average residential customer would pay about \$2 per year. Nimerick and Laflin (1977) indicate monetary losses ranging from \$19 to \$75 per car, assuming a price of \$45 per ton (metallurgical coal). Assuming Peabody sells its coal for \$10 per ton, this would be a loss of \$4 to \$16 per car.

Chapter II (con't)

The EIS author references a second study concerning coal loss from train transport of coal (Nimerick and Laflin, 1977, Dowell Division of Dow Chemical, a manufacturer of binders and crusting agents).

The EIS author reports a coal dust loss of .42 percent in this paper. This value cannot be found in the report. The Nimerick and Laflin report shows the loss of coal piled 3.8 cm (1.5 inches) above the top of a 4 1/2-inch x 8 1/2-inch x 2 1/2-inch deep bread pan and placed in a wind tunnel. Coal loss is reported as a function of wind speed and surface area of the pan. The loss per surface area is then incorrectly converted to coal loss per ton of coal. This incorrectly assumes that larger coal on the surface does not protect the coal beneath from wind erosion. This is contrary to one of three wind loss measures suggested by Nimerick and Laflin, "...adding of several inches of larger particulate on top of the finer particulate."

The Nimerick and Laflin report also states, "It is generally believed that coal losses are insignificant where moisture content is high, their speeds are slow and the transit time is short. Certainly all of these factors tend to minimize these losses. Laboratory testing indicates severe losses within one hour, at a wind velocity below 32 kph (20 mph) and moisture content concentrations of less than 12 percent....[T]he free moisture content of clean bituminous coal generally range from 5 to 12 percent. At these moisture levels only a small amount of erosion resistance is obtained....[T]he addition of enough water to fill at least 90 percent of the coals' porosity will protect the coal at high (100 kph) wind velocities."

It is noted that the coal, as mined at the Big Sky Mine, is approximately 25% water. The coal is additionally wetted at at least four (4) points at the coal handling facility. The EIS states on Page II-9 that, "The five near-surface aquifers in the vicinity of the Big Sky Mine are the Emile Coulee alluvial aquifer, the Rosebud coal, the McKay coal, sandstone beds that overlie the Rosebud coal, and sandstone beds that underlie the shale beneath the McKay coal." The coal mined at the Big Sky Mine is an aquifer and thus saturated and the coal shipped is protected from wind erosion.

In summary, the Nimerick and Laflin report does not give the amount of coal "dust" lost during transportation. Coal particles 3/4" in size blown off of a heaped-up bread pan does not represent actual coal loss from a railroad car and certainly does not represent the coal dust that gets into the air as suspended particulate or respirable particulate. It is assumed the EIS author has some other source of information not referenced and has not "created" the dust loss factors. The amount of coal dust lost during train transportation is unknown.

48 Nimerick and Laflin: Presumably 0.42 percent should be 0.5 percent. See response to coal trains.

Chapter II (con't)

49 The statement, "However, in high use areas (near towns or highways) the possibility of massive dust clouds being carried for many miles, causing public hazard and discomfort, does exist..." is speculation and immediately contradictory. The more massive the dust cloud is after a blast and, the further it travels, the less concentrated it becomes.

50 It is not explained how weather conditions can cause an increase in airborne noise from blasting, particularly above present levels. This section of the EIS is on the existing environment.

It is not known how blasting may create a nuisance to nearby inhabitants during inversions. How often do inversions occur, how intense, are they elevated, and how do they affect ground level sources such as blasting. Is the statement speculation or has some modelling been done to support the statement.

51 Page II-22 (D)(2)(a)(4) - TSP data from Site #2 are not indicative of minesite air quality problems. The hi-vol is poorly located, being beside an unpaved parking lot and under the influence of winds around the office, shop and storage buildings. Figure II-9, Page II-25, does not indicate a health problem to mine workers.

Data at Site #4, normally downwind of the mine, shows that the particulate indicated at Site #2 has dispersed and/or fallen out to nearly background conditions. The McRae site, further downwind of the mine, shows concentrations that are reduced to Site #1 values, normally considered upwind of the mine. The McRae data shows an annual mean concentration of 18-19 ug/m³ or the normal vale background for Montana and no effect from the mine. There is no standard for respirable particles.

52 Page II-23, Table II-7 - grossly exaggerates the potential emissions from the 1977 operation of the Big Sky Mine. Emission factors used to calculate potential (uncontrolled) emissions in most cases cannot be applied to coal mining operations, emissions have been duplicated and maximum emission factors have been used that are not recommended by the EPA.

Additionally, control efficiencies for dust control performed at the Big Sky Mine have been grossly underestimated. Recalculation of the "potential" emission shows an estimated total of 1128.0 tons per year and with accepted control efficiencies, the controlled emission rates total 551.2 tons per year. It must be noted that the 551.2 ton emission rate does not consider the fallout of large dust particles and is only a first estimate.

53 Page II-25, Figure II-10 - is incorrectly titled. The figure does not have the number of 24-hour averages that were above levels considered injurious to human health. The National Primary Standard

49 Dust clouds: The possibility does exist. A "massive" dust cloud may have concentrations of particulate matter that would cause public discomfort. The statement is not contradictory--the massiveness of a dust cloud does not necessarily relate to the concentration of particulates it contains, although the concentration would decrease with the distance from the source.

50 Blasting: Inversions can cause an increase in the distance that airborne noise from blasting is heard. Since blasting is a part of the existing environment at the Big Sky mine, this discussion is appropriate.

This statement is adapted from Grim (1974). Grim's findings are assumed to not be speculative. During inversions noise travels better through the air. Ground-based inversions are recorded almost every day of the year at the Colstrip weather tower.

51 Page II-22(D)(a)(4): Site 2 is where mine workers park their cars every day. The annual geometric mean for TSP was violated at the mine office in 1977. By 1985 the model used predicts that emissions from the mine and the mine office parking lot will cause the mine office monitor to record annual geometric means in excess of 150 $\mu\text{g}/\text{m}^3$. This is twice the State and Federal standard. EPA is currently defining a particulate standard.

Remainder of comment noted.

52 Page II-23, table II-7: See response to page II-22(D)(2)(a)(3); response 45.

53 Page II-25, figure II-10: See ECON comment responses; letter 20, response 5.

Chapter II (con't)

53 of 260 ug/m³ was set to protect human health with an adequate margin of safety (Part 50, National Primary and Secondary Ambient Air Quality Standards, 40 CFR). The inverse of the above statement, "levels above 260 ug/m³ are injurious to human health", is not necessarily true. It does, however, indicate the point of view of the author.

The standard of 150 ug/m³ is to protect human welfare or, a nuisance standard. It must also be noted that the National Primary Standard may be exceeded once per year and the Montana Primary Standard exceeded 1% of the days per year without being considered a violation. Concentration levels the author considers as "very unhealthful" are not given, nor can the statement be found from the reference given.

54 Page II-26 (D)(2)(c) - Emission factors used to derive emissions given in Table II-8 are not given or referenced. Estimates are not given of concentrations that "could cause health problems for local inhabitants". Inversion frequencies or inversion severity are not given. This is supposed to be a statement of existing environment, not speculation.

55 Page II-29 (E)(1) - Diversity reflects dynamic stability. In fact, this statement would indicate that the Big Sky soils have ceased development. This is not true. As soil develops, the plants and animals which can be sustained may also develop. Plants and animals are not restrained to a particular soil type. Use and over-use of plants by animals can cause permanent changes in vegetation regardless of the soil potential.

56 Confusion exists between the idea of limited vegetation cover on soils which are not highly developed and recent alluvial soils (not highly developed) which are deep and protective. Remedy: Start a new paragraph with, "Periodically, intense precipitation rapidly erodes..."

57 Percolation refers to a particular soils ability to cause water to infiltrate. Plant cover or soil clay content is a far greater cause for poor infiltration than low precipitation or high summer temperatures. On the other hand, precipitation, soil organic weather, temperatures, and sandiness of soils would determine greatly available soil moisture.

58 Page II-30 (E)(2) - Unless this section is being submitted as original work performed by the EIS teams (U.S.G.S., D.O.I., and Montana D.S.L.) as the soil survey for the Big Sky Mine site, the authors (Ecology Consultants, Inc. for example) should be foot-noted and a statement of concurrence with the authors should be made by the E.I.S. team and included in the Impact Statement'

54 For response to this comment see following page.

55 Page II-29(E)(1): The reasoning behind this comment is not clear. The discussion in the text is entirely in the present tense, indicating an ongoing process. Remainder of comment noted.

56 The differences between shallow upland soils and alluvial soils are noted in the text.

57 Percolation is a process, which can be quantified, of water moving through a given body of soil or soil-like material. It is dependent upon: (1) water availability (precipitation, snow melt, etc.); (2) soil porosity; and, (3) infiltration capacity. In the case of natural soils in a semiarid environment over an extended period of time, precipitation is the factor which limits the amount of water moving (percolating) through the soil profile, affecting soil development and mineral weathering. For detailed discussions on percolation see Buckman and Brady (1969), or Baver, Gardner and Gardner (1972).

58 Page II-30(E)(2): Paragraph 1 of this section notes that the information was submitted by the company (Peabody Coal Company) as part of the mining permit application. The soil survey in question was produced under contract to the company and is the company's responsibility. Footnoting of such information is not required.

Page II-26(D)(2)(c): Sources of various emissions factors are given below.

Appendix D-1.--Gaseous emissions factors

Activity	Gas	Emission factors	Source
Blasting:	NO _x	35.8 lb/ton prilled ANFO.	Chaiken et al., 1974, experimental.
	CO	42.6 lb/ton prilled ANFO.	Theoretical.
	HCN	0.108 lb/ton prilled ANFO.	Theoretical.
Population:	Particulates	0.06 ton/year/person	U.S. EPA, 1973.
	SO ₂	.07	
	CO ₂	.84	AQCR 143.
	NO _x	.17	
	Hydrocarbons (HC)	.13	
Population:	Particulates	0.30 ton/year/person	
	SO ₂	.44	AQCR 241.
	CO ₂	1.42	
	HC	.25	
	NO _x	.33	
	NO _x		
Locomotive, diesel:	Particulates	1.07 lb/mile	URS, 1976.
	SO ₂	2.45	
	CO _x	5.60	
	HC	4.04	
	NO _x	15.90	
	Organic acid	.30	
	Aldehydes	.24	
Heavy duty diesel-powered scrapers:			
Particulates	Particulates	27.3 lb/10 ³ gal	U.S. EPA, 1976.
	SO ₂	31.2	Table 3.2.7-1.
	CO _x	98.3	
	NO _x	419.0	
	Aldehydes	9.69	
	HC	42.2	

Appendix D-1.--Gaseous emission factors--Continued

Activity	Gas	Emission factors	Source
Heavy duty gasoline-powered trucks:			
	SO _x	0.0008 lb/mile	U.S. EPA, 1976.
	CO _x	.38	Appendix D.
	HC	.03	Table D.4-9
	NO _x	.028	and
	Particulates	.003	Table D.4-15.
Light duty gasoline-powered trucks:			
	1978 emissions		
	SO _x	0.0003 lb/mile	U.S. EPA, 1976.
	CO _x	.059	Table D.2-5.
	HC	.006	
	NO _x	.010	
	Particulates	.0012	Table D.2-16.
	1985 emissions		
	SO _x	0.0004 lb/mile	Table D.2-9.
	CO _x	.021	
	HC	.002	
	NO _x	.003	
	Particulates	.0005	
Light duty gasoline-powered cars:			
	1978 emissions		
	SO _x	0.003 lb/mile	U.S. EPA, 1976.
	CO	.020	Table D.1-9.
	HC	.002	
	NO _x	.004	Table D.1-21.
	Particulates	.0012	
	1985 emissions		
	SO _x	0.0003 lb/mile	Table D.1-17.
	CO _x	.006	
	HC	.0005	
	NO _x	.0005	
	Particulates		

Chapter II (con't)

59 Page II-30(E)(2)(2nd pp) - states, "Under ideal conditions, these rangelands may produce up to 1,600 pounds per acre of dry forage." This particular productivity has never been documented in our studies and if the E.I.S. team can support this statement, it should be referenced. Similarly, any discussion or statement of productivity should be referenced.

60 Page II-33(E)(2)(9th pp) - states, "The potential for "topsoil" salvage within the permit area is high. The total volume (5,303 acre-feet) of "topsoil" material suitable for salvage would cover the 1,264 permit area to an average depth of 50 inches, although not all of the area will need to be topsoiled following mining." Where is "the total volume (5,303 acre-feet)" documented? Is the fact that "not all of the area will need to be topsoiled following mining" attributable to not all of the area being disturbed? The wording of the second paragraph makes the company consultant sound willfully negligent and deceptive. It is assumed that 1,264 in paragraph #1 refers to acres.

61 Page II-33(E)(2)(10th pp) - states, "The company's soils consultant based his somewhat more conservative estimate of 2,827 acre-feet (average depth: 27 inches) on field estimates of calcium carbonate levels. Laboratory analyses of the soil indicate that chemical characteristics do not limit the soils as a "topsoil resource". A conservative estimate shows 2,827 acre-feet of topsoil suitable for salvage (Ecology Consultants, Inc.). The E.I.S. team estimates that up to 5,303 acre-feet permit area is disturbed then retopsoiled, a topsoil depth of 27 to 50 inches could be achieved. The final depth would be determined by the amount of calcium actually found during the topsoiling process."

62 Page II-33(F) - This section, as in the soil section, needs to reference its data and statements.

Since this section is directed primarily toward an audience who understands ecological relationships, scientific names should be used with the common name following in parentheses. Once the name has been introduced into the text and its occurs again later in the text, the common name should be dropped. Not only is it difficult to determine exactly what plants are being referred to when only common names are used; but, the absence of scientific names confuse the accuracy to which a survey was performed. For example: the use of the word *salsify* may refer to many plants, while the use of *Tragopogon dubius* (the most abundant kind of *salsify* at Big Sky) refers specifically to yellow *salsify*. If an author had to use *Tragopogon* spp., the reader would know that either several *salsifies* occurred at relatively equal abundance or that the one *salsify* which did occur was not able to be keyed to species.

59 Page II-30(E)(2)(2d par.): The figure 1,600 pounds per acre is a conservative one derived from Soil Conservation Service Range Sites, from productivity, and from exclosures located at the adjacent Rosebud mine. Under long term conditions of excess grazing pressure, productivity is severely reduced.

60 Page II-33(E)(2)(9th par.): Table II-9 details both proposed and potential salvage depths. Volumes are calculated by multiplying area by depth. The statement, "not all of the area will need to be topsoiled following mining" was an editorial addition and should be deleted. The original text included the observation that 50 inches was much greater than required for adequate topsoiling, but the large volume of potential topsoil material would allow the selection and use of more nearly optimal material. The observation that the consultant made conservative field estimates of topsoil salvage is hardly a statement or implication of willful neglect. The fact that Peabody did not provide their consultant with lab analyses until well after the report was required necessitated a conservative estimate of salvage depth.

61 Page II-33(E)(2)(10th par.): Comment noted.

62 Page II-33(F): This section is not directed primarily toward a scientific audience; hence, common names were used in the text, and scientific names were provided in the appendix.

63 The generalities concerning the grasses occurring in scrub types were meant to be general. Specifics were provided in appendix F-2. The goal was for everyone to read this section, without becoming totally frustrated with and/or bogged down in nomenclature.

Chapter 11 (con't)

- 63** The statement of which grasses occurred in the scrub types was too general. Each variety of scrub should have had the perennial grasses listed. Several of these varieties were noted as being excessively grazed. If, for example, the perennial grasses had been noted and if the "increasers" had been shown to have increased, valuable material could have been provided to support the mere presence of annual grasses and supposed "weedy" species.
- 64** Page 11-37 (F)(4) - These species have not been found on the current reclamation areas. The reclamation areas have certainly been disturbed. Therefore, the threat of invasion by these noxious species is overstated.
- 65** Page 11-37 (G) - While there is an encompassing footnote to reference who performed the wildlife studies, each reference should be listed and as statements are made in the text the reader should be directed to specific and accurate references.
- 66** Page 11-38 (G)(4) - states, "Prairie falcon nests are probably located on the permit area among the rock outcrops shown in Figure 11-15." Peabody Coal Company has been conducting extensive wildlife programs for the last three (3) years. During these studies, prairie falcons have not been identified within the rock outcrop; therefore, the statement should be invalid unless specific sightings have been made by a recognized authority.
- 67** Page 11-40 (G)(5) - If the criteria for habitat ranking cannot be disclosed in full in this document, the consideration of "prime habitat" should not be noted.
- 68** Page 11-42 (G)(9) - Eagles have been observed in the area. However, no nests have been located on the proposed permit area.
- 69** Page 11-67 (O) - The statement in the first sentence seems contradicted by the statement in paragraph four, second sentence.
- 70** CHAPTER 11
Page 11-1 (A) - This section should be modified to reflect changes in the postmine reclamation contour maps which were recently submitted to the Department of State Lands and Office of Surface Mining. Depressions will not be created on the slope unless authorized by the regulatory authority.
- 71** Page 11-1 (A)(1) - states, "Water released from settling ponds would be sediment-deficient compared to natural stormflow and would disrupt the natural equilibrium of ephemeral channels below the mine." Peabody Coal Company requests that if this impact is adverse according to the D.S.L., or the E.L.S. team, that a variance be granted from the 30 mg/L

- 64** Page 11-37(F)(4): As that DES stated "No known threatened, endangered, or noxious species are known to occur in the permit area;" hence, the threat of invasion by noxious species is not overstated.
- 65** Page 11-37(G): It is not necessary to repeatedly reference company application materials that formed the basis of this section.
- 66** Page 11-40(G)(4): Comment noted. Change "are probably" to could possibly. Monitoring reports note "Several observations were recorded of unidentified buteos and falcons. Prairie falcon (Falco mexicanus) observations were made several times near the study area. A successful nest of this species was found during a concurrent study adjacent to the Big Sky mine study area in a sandstone outcrop." A brief survey (emphasis added) of the Big Sky mine area's outcrops located one golden eagle nest, an active great horned owl nest, and several songbird nests.
- 67** Page 11-40(G)(5): Comment noted. It was an editorial decision not to reproduce in detail all references cited. Should the reader want information on criteria for habitat ranking, (s)he is referred to the reference cited in the footnote: U.S. Fish and Wildlife Service and the Montana Department of Fish and Game (1978), Ranking of wildlife on Federal coal lands: Montana, FWS/OBS-78/50, v. 2, 27 p.
- 68** Page 11-42(G)(9): As the DES states, "Eagles have been observed in the area;" hence, the point of your comment is not clear. Add to text: No known endangered species occur on the Peabody permit area.
- 69** Page 11-67(O): Comment noted. However, the "above average scenic quality" mentioned in the first sentence is consistent with "the site itself is unusual" mentioned in the 4th paragraph, 2d sentence. The similarity of the site to other sites throughout the region indicates that this region contains numerous unusual sites of above average scenic quality (not all of which are being mined).
- 70** Page 11-1(A): The revised reclamation plan is addressed in chapter 1 of this volume of the final EIS.
- 71** Page 11-1(A)(1)(3d par.): The impact could be avoided by controlling the rate of discharge, without requiring a variance from State and Federal regulations.

Chapter III (con't)

71 total suspended sediment concentration in order to rectify the potential problems that the D.S.L. or E.I.S. team feels appropriate. Peabody requests guidelines to release total sediments above the 30 ppm recommendations. This impact, as stated in this particular section, places Peabody in a Catch-22 situation, in that we are required to comply with Federal and State regulations and the 30 ppm requirement. If this requirement creates an adverse impact below the mine as a result of complying with existing regulations, Peabody should not be held liable for such disturbance.

72 Page III-3 (A)(1)(3rd pp) - states, "In places, where coarse-textured soils would be placed over fine-textured compacted spoils, piping, a cause of gullying, could result". This has not been demonstrated on the mine site, nor is it anticipated. Impacts should not be stated which have not been demonstrated or documented in the field. Peabody has already made a commitment that rills or gullies greater than 9 inches will be corrected as approved by the Department of State Lands. It also states, "In addition, the reclamation surface would generally have higher erosion rates than the original surface because of the increased runoff resulting from decreased infiltration rates...(Arnold and Dollhopf, 1977)." This particular statement is extremely misleading in that the final reclamation contours will have a lower topography and less slope than previous conditions which, in turn, will offset any increase in soil erosion. In addition, the decrease in infiltration may be beneficial to the existing mine site and provide needed soils moisture storage capacity in excess of preexisting soils and may offset droughty conditions which are prevalent in a particular area.

73 Page III-3 (A)(1)(4th pp) - states, "The settling pond formed behind this dam probably would fill with sediment, would break, and then would gully". All coal mining operations must comply with the Office of Surface Mining Rules and Regulations. The regulations (30 CFR 816.46) prohibit sediment ponds from over filling, thus eliminating the problem as stated.

74 Page III-5 (H)(1)(2nd pp) - The revised reclamation plan does not contain planned depressions.

75 Page III-6 (B)(1) - states, "The main surface water impacts occurring as a result of mining would be increased sediment yields and increased runoff." Based on the postmine reclamation contours, and the proposed reclamation plan, it appears that sediment yield and runoff would be reduced as a result of the mining activity.

76 Page III-7 (B)(2) - states, "As the land surface is disturbed by mining, it would be replaced with a reclaimed surface having a higher erodibility potential." This may be in conflict with the impact summary in that reduced infiltration may be an indication of reduction in the erodibility factor.

72 Page III-3(A)(1): Piping has been observed at reclaimed minesites in both the Colstrip and Decker areas of southeastern Montana.

Arnold and Dollhopf (1977) conducted their study on reclaimed surfaces at Big Sky, where, presumably, topography had been lowered and slopes had been decreased by mining and reclamation. Yet their results showed a dramatic decrease in infiltration rates. Although decreased slope should increase infiltration, it is apparently insufficient to counterbalance the decrease from other factors (primarily soils).

Decreased infiltration would not beneficially increase soil moisture. Less water would enter the soil, and surface runoff would be increased.

73 Page III-3(A)(1)(4th par.): The cited regulation applies to sediment settling ponds during mining, and before their removal during reclamation. The impact analysis discussed the damming of Emile Coulee drainage by the reclaimed surface, thus creating a settling pond. This situation is not covered by the regulation.

Under the revised mine plan, the reclaimed surface is better integrated with the surrounding landscape, and this impact would be avoided.

74 Page III-5(H)(1)(2d par.): The revised mine plan was not available when the draft EIS was written.

75 Page III-6(B)(1): Hillslope runoff and erosion would be increased because of decreased infiltration, and increased erodibility. Under the original mine plan, much of this increased runoff and sediment would have collected in closed depressions. As a result, runoff and sediment yield from the reclaimed surface to the downstream drainage would have been reduced. However, under the revised mine plan, runoff and sediment yield to the downstream drainage would probably be slightly increased.

76 Page III-7(B)(2): Reduced infiltration would increase both surface runoff and sediment yield.

Chapter III (con't)

77 Page III-7, Table III-1 - Big Sky Estimated Sediment Yields. It should be pointed out on this table that these are not delivery ratios to an impoundment, or the amount of sediment that would be removed from the lease area. It only represents the amount of material that would be removed within or adjacent to the lease area. It would, however, be beneficial to represent what baseline or natural conditions are in order to give relative indication of sediment removal from the disturbed area.

78 Page III-8 (B)(2)(3rd pp) - states, "A pond in the northern part of Section 24 would no longer receive water due to the interception of flow by a closed depression designed into the reclaimed surface." This paragraph can be deleted because of a modification to the postmine reclamation contours in Peabody's proposed mine and reclamation plan.

79 Page III-10 (D)(1) - Since no predictive modelling has been done to predict the concentrations due to dust from the Big Sky expansion, no statement can be made of the impact on attainment areas.

The 5,445 ton estimate is not "potential" emission, rather it is the author's estimate using not only incorrect, but the largest emission factors ever proposed. EPA proposed emission factors have, by and large, been ignored or misused.

80 Best Available Control Technology (BACT), cannot be decided by the author; but on a case-by-case basis by the EPA and the applicant.

BACT proposed by the author includes the use of a "Blasting Mat", the nature or effectiveness of which is unknown. No reference is given to any research on a blasting mat and is thus assumed to be a product of the author's imagination.

Inadequate control efficiencies have been attributed to present dust control techniques (watering at all conveyor end-points, crusher, reclaim, etc.).

81 An author suggested BACT measure given in Table III-2, proposes spraying hot oil on coal at the rate of 1.5 - 2.0 gallons per ton of coal to control dust. It is not known how effective this measure is in controlling dust, or for that matter, what the uncontrolled dust emission rate is.

82 Dust emissions for the proposed expansion are not given. This is the subject of this EIS: "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana".

83 (1) "(d) deposition of potentially toxic trace elements in overburden and coal dust onto the surrounding environment." Many of these

77 Page III-7, table III-1: Estimates of sediment yield are less than estimates of erosion would be because sediment yield takes delivery ratio into account. Therefore, they do estimate the amount of sediment that would be removed from each subbasin in the lease area.

As indicated in the footnote to table III-1, sediment yields during mining and before reclamation becomes effective are assumed to be 2.5 times natural rates.

78 Page III-8(B)(2)(3d par.): The revised map was not available at the time the draft was written.

79 Page III-10(D)(1): The predictive model shows that there will be no significant change in ambient concentrations of particulates beyond the immediate vicinity of the mine after the expansion. Increments of between 10 and 5 $\mu\text{g}/\text{m}^3$ (annual geometric mean TSP) will cover about 20 percent more area after the expansion. The annual geometric mean TSP would not increase in the town of Colstrip due to the Big Sky mine expansion.

80 BACT should be replaced with BTCA, best technology currently available. Given the information provided by the company and the fact that the company and EPA have not determined BACT, BTCA is the only feasible means of evaluating the company's proposal.

81 Estimates of uncontrolled emissions have been provided numerous times in the literature and have been cited in the text. Estimates of the effectiveness of hot oil spray are provided in table III-2 of the draft (volume I).

82 Dust emissions for the proposed expansion are given in table III-2 of the draft (volume I) under the heading "Projected actual particulate emissions." Potential emissions were determined using EPA recommendations.

83 (1) See vegetation impacts.

Chapter III (con't)

- 83 same trace elements are also necessary for life. What concentrations are toxic to what?
- 84 (2) "(m)inor or undetectable changes in plant community productivity and composition." Will changes be good or bad? If minor or detectable, are they significant?
- 85 (3) "(p)otential trace element toxicity to honeybees." No reference, speculation?
- 86 (4) "(d)etectable increases in respiratory diseases in domestic animals." Are increases significant? No reference or documented evidence.
- 87 (5) "(p)ossible respiratory diseases in mine personnel." Reference?
- 88 (6) "(a) decrease in the visibility characteristics and esthetics of the area." No calculation of the visibility has been made nor statement of existing visibility. This is speculation.
- 89 What does "significantly alter the biological stability" mean? What does long term mean?
- 90 Page III-11 (D)(2) - Unit trains would not distribute "4,200 to 17,640 tons of coal dust annually along the 800-mile railway corridor..." This is completely false and misleading. We are talking about less than two (2) trains per day from the mine. Where did 35 trains per day come from? This whole paragraph is nonsense.
- What "indirect evidence"? This paragraph gives no particle size information and is entirely speculation. This is supposed to be an environmental impact statement?
- It is not possible for an air pollutant to "accumulate". Dust concentrations would increase under low winds if the emission rate of dust were constant. However, as winds decrease so does the dust emission rate.
- 91 Page III-13 (1st pp), Table II-2 - "Hydrologic Data for Watersheds in Big Sky Lease". Is the reference on Page III-3 an error? What is the increase in population expected to be and what is the impact of the increase? Table III-2 does not give the emissions for the Big Sky expansion either. What is the increase in gaseous emissions and how were they calculated?
- 92 Page III-13 (D)(3) - It is not understood how nitrous oxide, an invisible gas also known as laughing gas, can "impair highway visibility and causing considerable discomfort to living organisms downwind of the blast."
- 84 (2) See vegetation impacts.
- 85 (3) See wildlife impacts, page III-20 (6).
- 86 (4) See wildlife impacts page III-20, (4) and (5).
- 87 (5) Surface strip mining is too new, at this scale, to rule out the possibility of respiratory irritation or disease in persons working in a very dusty environment. See appendix D-6 of the draft (volume I).
- 88 (6) Small particles in the range of 0.1 to 1.0 micron are very efficient light scatterers. An increase in emissions would increase the amount of these fine particles. Samples of dust taken during flights through visible strip-mine dust plumes show a significant amount of these fine particles (University of Wyoming, 1977).
- 89 This means that the species diversity and vegetative mosaic could change appreciably. The long term would be for several decades.
- 90 Page III-11(D)(2): Comment answered earlier. See references cited for particle size information.
- 91 Page III-13 (1st par.), table II-2: Change table II-2 to table III-3. The increase in population is given on page III-23 (H)(1), first sentence. Emissions for the Big Sky expansion are the second column of numbers in table III-2. Gaseous emissions are given in appendix D-5, as stated on page III-13 (D)(3) first paragraph second sentence.
- 92 Page III-13(D)(3): Change "nitrous oxides" to oxides of nitrogen. The reference is especially to NO₂.

Chapter III (con't)**93**

Page III-13 (D)(4)(b) - The statement, "Dust generated by mining operations at the Big Sky Mine could be expected to affect human health", is misleading and cannot be substantiated. Dr. Bergren's statement, was "The inhalation of sufficient amounts of any dust over a prolonged period of time will produce some type of disease, either irritative or chemical (Wolf, F. A., 1975)." Dr. Bergren apparently has not done any research of his own on this.

The version presented in Appendix D-6 references other's statements only. "Sufficient quantities" and "prolonged period" are not identified or related to quantities or periods at the Big Sky Mine.

What is the silicon content of coal at Big Sky? Is it significant? What is the particle size fraction of dust at the Big Sky Mine? Is it significant? What concentrations of coal dust cause a health hazard? What is the predicted concentration of coal dust from the Big Sky Mine expansion?

94

Page III-13 (E)(2nd pp) - states, "The major problem with the reclamation plan involves the proposed final surface topography, which is designed to include numerous depressions up to 10 acres in size. These depressions would occupy less than 5 percent of the area disturbed but would influence that entire reclamation surface." This should be deleted as a result of filing a modified reclamation plan which deletes depressions.

95

Page III-14 (E)(3rd pp) - states, "Productivity on the reclaimed surface would be... (to end of pp)". Peabody is required to bond its reclamation efforts with a period of liability in the precipitation regime found at the Big Sky Mine (less than 26 inches/year) of ten (10) consecutive years following the last year of land treatment (30 CFR 805.13(b)). Bond will not be released until such time as diversity and productivity have reached levels acceptable to the regulatory authority. Thus, when bond is released (by definition, the period at which short-term impacts are described) productivity and diversity will be at a par or greater than are currently found at the site.

96

Page III-14 (E)(4th pp) -states, "Physical and biological impacts to the soils would be more severe..." I object to the use of the word severe, even in relative terms, when an impact is not considered "highly significant".

97

Page III-14 (E)(1) - states, "Water infiltration and permeability would decrease, resulting in greater runoff and erosion rates, and decreased soil water shortage for plant use and growth. This would be caused by complete loss of structure and increased bulk density. Bulk density of the surface soils would increase to a range of 1.55 to 1.75 grams/cm³ from an already high 1.45 grams/cm³ (Arnold and

93

Page III-13(D)(4)(b): Comment noted.

94

Page III-13(E)(2d par.): See soils revision in chapter I of this volume.

95

Page III-14(E)(3d par.): Comment noted. Legal and economic inducements do not necessarily lead to biological success.

96

Page III-14(E)(4th par.): Objection noted.

97

Page III-14(E)(1): The study cited included two topsoiled sites (revegetated and nonrevegetated) and one nontopsoiled revegetated site, in addition to a native range control (reference) site. Mitigations noted by Peabody have not been demonstrated to restore infiltration, percolation, or soil-water storage parameters to premining levels.

Chapter III--Continued

97 Dollhopf, 1977). Denser soils would increase resistance to root growth, encouraging shallow rooting and susceptibility to drought." It should be clarified that this particular research was conducted on compacted spoils without topsoil and without reclamation management. It should also be clarified that Peabody Coal Company is committed to retopsoiling, gouging, and soil preparation, as required on the permit application which would mitigate the potential problems which have been alluded to in this section.

98 Page III-15 (E)(1)(3rd pp) - No studies of activities of soil microorganisms under similar conditions have been referenced. The statement is conjecture, without documentation.

99 Page III-15 (2) - states, "The most pervasive chemical effect would be an increase in molybdenum uptake by plants, especially legumes, because of the increased availability of this element in spoils. This uptake could cause copper deficiency disease (molybdenosis) in grazing animals (Erdman, et al., 1978). This problem may become insignificant by the time of bond release, because legumes may no longer be part of the plant community. The vegetation would be widely affected because molybdenum levels exceed State guidelines in all or part of every core-hole analysis submitted. Plant absorption of other metals probably would be low due to high soil pH. In the case of toxic heavy metals, this would be beneficial, although it would also inhibit the availability of some nutrients."

100 First of all, it appears that the spoil material which occurs (after grading) just below the replaced topsoil is of comparable molybdenum (Mo) concentrations to the native topsoil. Second, it is important too that not only do the core holes exceed the State guidelines for Mo concentration so do the native topsoils. Third, Erdman was flagrantly taken out of context by the paraphrase. In a paper presented to the 4th Biennial Veterinary Toxicology Workshop, Erdman states, "the total Mo concentration in spoils materials (unpublished data) shows no relationship whatsoever to the Mo in plants." ("Potential Toxicological Problems Associated with Strip Mining", James A. Erdman, U.S.G.S. Denver, Colorado 4th Biennial Toxicology Workshop, June 18-23, Utah State University, Logan, Utah 84322, p. 8.13) Fourth, in a letter from Dr. B. Hubbell, Jr., Department of Veterinary Medicine, Chief of the Diagnostic Laboratory, it is stated that "no evidence has been found of molybdenum toxicity within the state". To suggest that molybdenum will be a potential problem of the reclamation would be no more than speculative.

101 Page III-16 (E)(1)(1st pp) - Please supply references for this statement.

102 Page III-16 (E)(2) - discusses vegetation productivity. Peabody Coal Company has adequately addressed the procedures in reestablishing vegetation productivity utilizing legumes, mulch, and appropriate

98 Page III-15(E)(1)(3d par.): See Harsman, L. E., and Temple, K. L., 1978, ATP as a parameter for characterizing coal strip mine spoils, Soil Science, vol. 126(6), p. 350-352. This study documents reduced microbial levels.

99 Page III-15(2): Molybdenum levels are important in relation to copper levels, which must also be considered.

100 With respect to the work of Dr. Erdman and his colleagues, the fact remains that molybdenum:copper ratios in legumes, (clover) on mined lands, especially mined lands at Peabody's Big Sky mine are within the range where "molybdenosis should occur in cattle" (Erdman and others, 1978). There is a possibility that a molybdenosis problem could develop.

101 Page III-16(E)(1)(1st par.): The potential productivity trends are based on DePuit and others, 1978. Nutrient availability and cycling patterns discussed here are drawn from basic nutrient availability and cycling concepts. These concepts are discussed (Richards,* 1974) in adequate detail. Until such time as nutrient cycling studies are undertaken and the results made available, a theoretical explanation of observed phenomenon will have to suffice.

*Richards, B. N., 1974, Introduction to the soil ecosystem: London, Longman Group, Ltd., 266 p.

102 Page III-16(E)(2): Productivity levels discussed in this paragraph, as stated, are beyond those which experience can document: "There is insufficient data available to determine the long-term productivity, following mining, in this region. Peabody Coal Company has been required to reexamine and reformulate reclamation plans by the Department of State Lands. The revised mine plan is a marked improvement, but the basic assumption that onsite performance (in the past somewhat irregular), in conjunction with climatic variables, will determine long-term productivity remains.

Chapter 111 (con't)

102 seed mixtures. Based on initial findings, reclamation is progressing in a successful manner, diversity is improving. It has not been determined that growth rates have not decreased dramatically as stated in this paragraph. This paragraph should reflect current impacts based on existing mine and reclamation methods. It appears this particular paragraph is making unfounded assumptions.

103 Page 111-16(E)(2)(2nd pp) - A prediction of the relative productivity rate is given in a decidedly conservative (negative) statement, followed by a disclaimer on the present ability to make such a statement. All that is currently known is that the potential rate of productivity reestablishment "... depends on the skills applied..."

104 Page 111-16 (E)(2)(3rd pp) - states, "If a problem of long term accelerated erosion rates and sediment accumulation is correct, "topsoil" spoils could be expected to develop a weak platy or granular structure to a depth of 2.5-5 inches within the life of the mine." Once again, this is conjecture, and based on our mine and reclamation permit application, it is believed this problem will not occur with proposed revegetation methods.

105 Page 111-16 (E)(2)(4th pp) - states, "Overgrazing, heavy recreational use, or other mismanagement after bond release would lead to accelerated erosion and gullying. Once initiated, such processes are difficult to correct and could easily result in the area becoming barren and unproductive." This particular statement is not applicable to the Big Sky Mine permit amendment nor to bond release. The management of the mine area after bond release is under the management of the future landowner. Overgrazing, heavy recreational use, and mismanagement of the future landowner are factors of land use management as required by the county and state and should not be incorporated into an impact statement which deals with mine-related impacts. After bond release, the land that has been released will be in better management condition than preexisting land uses and, therefore, an asset to the local rancher and future land owner. The EIS team should not have stated potential impacts resulting from future landowners on areas no longer operated or controlled by the Company.

106 Page 111-17 (F) - states, "The most serious impact on vegetation would be long-term elimination of the natural vegetation mosaic and species diversity." According to the regulations, Peabody Coal Company is required to restore postmine vegetation to be compatible with the premining vegetation and species diversity. The long-term impacts as indicated in this section will not be adverse impacts. This entire section is not, as the first sentence indicates, a description of the "long-term elimination of the natural vegetation mosaic and species diversity". It is, rather, a description of the recovery process to a point of plant and community diversity.

103 Page 111-16(E)(2)(2d par). Comment noted.

104 Page 111-16(E)(2)(3d par.): This quote is incorrect. The third word, second line, is "corrected," not "correct." This paragraph assumes the best possible reclamation efforts and results. The development of a granular structure to a depth of 5 inches within the life of the mine would be very desirable. The second sentence (not quoted) makes this clear.

105 Page 111-16(E)(2)(4th par.): Peabody has cited this quote out of context. A previous sentence makes the point that, because of soil disturbance caused by mining, the postmining surface would probably not be suitable for incorporation into normal land use patterns, since normal patterns of land use historically have involved heavy use by cattle. This is demonstrated by the low levels of vegetative production reported by Peabody and others as part of the baseline data supporting the permit application. At the present time, loss of grazing land resilience and susceptibility to increased damage by overgrazing, heavy recreational use, or other mismanagement are unavoidable impacts of surface mining and should be recognized by any subsequent user of the land. It is also true that there is a potential for increases in actual vegetative productivity after mining. Under management which recognizes the inherent long-term limitations of reclaimed land, actual carrying capacity may be increased.

106 Page 111-17(F): Regulations do not control physical and biological processes. Hence, it cannot be assumed that the vegetative mosaic and species diversity will be returned within 10 years, nor can it be assumed that long-term impacts would not be adverse. Long-term data on mine reclamation in the northern Powder River basin are insufficient. Remainder of comment noted.

Chapter III (con't)

- 107 Page III-18 (F)(3rd pp) - The Department of State Lands is requiring the replacement of alluvial soils to reclaim moist drainages. This precludes the use of alluvial material for general reclamation as alluded to on Page II-29.
- 108 Page III-19 (F)(1st pp) - states, "Due to the alkaline pH of the soils of the region, only the molybdenum from the dust would be absorbed in potentially harmful quantities through the roots (sic) plants." This has not been demonstrated, nor is it technically justified when disturbed soils have approximately the same molybdenum content as the native range. Consequently, it is doubtful that molybdenum will be potentially harmful. It then states that coal dust may alter the local microclimate. This has not been demonstrated in southeast Montana and should not be presented in the EIS as a possible impact. It is purely conjecture. Paragragh three states, "In addition to causing dust, increased off-road vehicle travel would create significant localized soil compaction". Peabody Coal Company is required to reclaim the land to approximate premine levels. If local soil compaction occurs, Peabody has incorporated a ripping and gouging program to mitigate soil compaction problems. Therefore, this should not be included in the impact section of the EIS. Rather, it should be incorporated into the mitigation section, if at all.
- 111 Page III-19 (F)(2nd pp) - states, "The presence of coal dust on the soil surface may also alter the local microclimate, increasing absorption of solar radiation, and changing the temperature regime of the soil..." Would this change enhance or degrade plant growth? Would not warmer soils for longer periods of the year increase plant growth rate and production? What is the predicted extent of this effect?
- 112 Page III-20 (c)(1st pp) - Peabody has done preliminary evaluation of fugitive dust. Preliminary findings indicate more fugitive dust is being generated from agriculture adjacent to the mine than is actually being generated by the mine property. Therefore, the statement, "Secondary impacts would include loss of plants by dust contamination which would adversely affect animals dependent upon those plants for food and cover" appears unfounded and misleading.
- 113 The second paragraph, same page, states, "Long-term ingestion by cattle of dust particles containing arsenic, beryllium, fluorine, lead and zinc may adversely affect..." There has been no documentation that fugitive dust settlement on vegetation would have this affect. Therefore, it should be considered unfounded and not stated in the impact section.
- 114 The fifth paragraph which states, "Trace elements tend to accumulate in insect systems...", is incorrect because all preliminary
- 107 Page III-18(F)(3d par.): As stated in the EIS, "The Department is also requiring the selective salvage and replacement of alluvial soils in order to more successfully reclaim the moist drainages that existed prior to mining." As such, it should be clear that the alluvial soils are unavailable for general reclamation.
- 108 Page III-19(F)(1st par.): See responses for comments on the following pages: II-5, tables II-1 and III-15 (2); reponses 34 and 99.
- 109 MEPA and NEPA mandate that potential impacts be addressed. Basic meteorologic principles support the contention that coal dust may alter microclimate (Lowry, 1969).
- 110 3d paragraph: Localized soil compaction is an impact; MEPA and NEPA require potential impacts to be addressed. This does not belong in the mitigation section.
- 111 Page III-19(F)(2nd par.): Data are insufficient to know if this would enhance or degrade plant growth. The extent of the effect is unpredictable.
- 112 Page III-20(G)(1st par.): Coal mine dust is very different from road dust. This statement is not unfounded or misleading. It is not the function of this EIS to analyze the impacts of agricultural dust.
- 113 MEPA and NEPA mandate that all potential impacts be addressed. In the absence of substantial data, the evaluations have been qualified.
- 114 (5th par.): Please document this statement. The literature supports the statement made in the draft.

Chapter III (con't)

- 114** investigations suggest that trace elements are not being taken up by insects within the Big Sky mine.
- 115** Page III-21 (C)(1) - Where numbers are available to quantify impacts, they should be used. For example, the mule deer herd composition in the fall at Big Sky Mine ranged from 20 in 1975 to 144 in 1977. In 1978, 127 separate observations were made in the winter at Big Sky Mine. The Ponderosa Pine-Grassland, Skunkbush-Grassland, and Saltbush-Rabbitbush habitats (representing 43% (674 acres) of the study area) was utilized by 86% of the mule deer. This amounts to approximately 0.16 mule deer/acre utilization. (All of the above data taken from ECON, 1978, Annual Small Mammal and Vegetation Report, Big Sky Mine.)
- Since three (3) habitat types mentioned above comprise about 250 acres of the study area being considered in this impact statement, it can be estimated that we are affecting the winter range for about 40 mule deer with the proposed project (250 acres at 0.16 mule deer/acre utilization). The same type of numbers can be generated for all big game and small mammals.
- 116** Page III-21 (C)(4) - Information gathered from wildlife surveys indicate that small mammal populations are extremely high within the reclaimed areas. This particular impact should be rewritten to indicate such.
- 117** Page III-22 (C)(5) - This section discusses the potential impacts on raptors. Peabody Coal Company has submitted a mine and reclamation plan that would protect raptor nesting as much as possible. Peabody has made a commitment to protect raptors within the project area and has recently contracted a consultant to evaluate raptor behavior within and adjacent to the permit area. It is believed, based on the study plan, that raptor habitat can be improved as a result of mining.
- 118** Page III-22 (C)(6) - states, "...the direct and indirect loss of nesting and wintering habitat due to mining could alter sharptail population dynamics of the Peabody area." Based on three (3) years of study, sharptail grouse has not changed in population density.
- 119** Page III-22 (C)(8) - Peabody Coal Company's proposed mine and reclamation plan anticipates leaving denning sites and thus not affecting the existing prey base.
- 120** Page III-23 (H)(1) - The projected increase in personnel necessary for the expansion of Big Sky Mine is 32 people. With the average family consisting of 4 people, the increase in total population should be 128, not 163. If there are references for this section, they should be noted.

- 115** Page III-21(C)(1): Comment noted. This report was not available prior to distribution of the DES.
- Comment noted. Insert in text after first sentence under mule deer: Schwarzkoeph states (written communication, 1979) that his observations indicate the primary wintering area lies to the north of the Peabody permit area. Impacts would likely affect only general winter range. Delete next sentence.
- 116** Page III-21(C)(4): "Immediately after a cover crop is started on newly reclaimed land, small mammals respond favorably to the increasing cover and food and the absence of any small mammal populations. Then, as years pass and the vegetation develops and diversifies, the small mammal population in turn drops and begins to stabilize and adjust to the available cover and food and to the inherent population pressures. This was observed from data gathered in the DNR and RR sites." Source: Peabody Coal Company, Small Mammal Report.
- 117** Page III-22(C)(5): This plan was not available prior to the publication of the draft EIS.
- Comments noted.
- 118** Page III-22(C)(6): Population dynamics and population density are not one and the same. Comments noted.
- 119** Page III-22(C)(8): Leaving a denning site does not preclude a prey base from being affected.
- 120** Page III-23(H)(1): The projected increase in population is not the result of additional mine employment. As base employment increases, so does ancillary employment; satellite businesses or services, or the growth of businesses and services, also result in population increase. Add to table III-3: [Source: Coaltown II model; Temple, 1978].

Chapter III (con't)

121 Page III-24 (I)(1) - This is to be a site specific EIS. Why are references continually made to possible expansions elsewhere and the effect of these possible expansions elaborated on?

122 Page III-27 (K) - "Secondary impacts to future land use would occur from the inadequate reclamation proposed in the company's plan." The adequacy of the reclamation program should be the decision of the D.S.L. and O.S.M., both of which are staffed with mine reclamation experts. The statement "inadequate reclamation" should not be made by parties who evidently do not have a thorough knowledge of mining and the rules and regulations which govern the reclamation programs.

123 Page III-27 (K)(1) - A revised grading plan was requested and submitted, and all proposed depressions were deleted.

CHAPTER V

124 Page V-1 (1st pp) - "Erosion rates up to about 2.5 times above normal would return to normal only after long periods of time." This statement is highly speculative and undocumented.

125 Page V-1 (2nd pp) - The statement that the flow from the spring in Emile Coulee might decrease is speculation, and the flow may very well increase, and should be so stated.

126 Page V-1 (3rd pp) - It is not known that concentrations of dust will nearly double. What is the expected increase in concentration due to the mine expansion?

Proposed dust control measures do not represent best available control technology because it has not been defined, has it? Are not State and Federal RSP standards violated naturally?

Where are the estimates of visibility and esthetic value reduction? What does "disruption of ecosystem stability" mean? Where are references to "diminished livestock productivity" and, is it significant?

127 Page V-1 (4th pp) - states, "There would be reduced productivity, infiltration, and permeability of topsoiled materials, which in turn would affect vegetation and wildlife production." Our analysis indicates this effect of mining and the change in infiltration and permeability rates would be beneficial in that it would improve soil moisture holding capacities which would enhance the possibility of revegetation being sustained throughout the dry periods. The adverse impact on mule deer winter range is unfounded. As a result of the proposed mine and reclamation permit application which Peabody has

121 Page III-24(I)(1): Environmental statements are supposed to address all impacts, including cumulative. Very little elaboration of possible expansions is presented. The elaboration provided merely is stating the assumed future conditions under which the impacts were analyzed.

122 Page III-27(K): Revise the statement to read: Unnecessary secondary impacts to future land use would occur from the reclamation as proposed in the company's November 1977 plan.

123 Page III-27(K)(1): Comment noted.

124 Page V-1(1st par.): This statement is a summary of material from chapter III. As such, documentation is provided in chapter III and not here.

125 Page V-1(2d par.): This statement is a summary. The qualifier "might" indicates the converse may also be true. An increase in the flow of the springs is unlikely.

126 Page V-19(3d par.): This statement is a summary of information provided in chapter III. It is expected that "concentrations will nearly double" due to the mine expansion. Existing emissions are provided in chapter II, Existing Environment. Emissions for the expansion are in chapter III, Impacts.

BACT has not yet been defined for the proposed expansion. If it were, and were employed, the air quality would be improved.

Data are insufficient to provide the answers. Ecosystem stability is defined in any basic text. The significance of diminished livestock productivity is undefined, as mining at this scale has not occurred in the Powder River basin long enough for a determination to be made.

127 Page V-1(4th par.): Comment noted. Please document your analysis.

Chapter V (con't.)

- 127 submitted, the revegetation plan will be incorporated with the existing wildlife habitat. Therefore, impacts on big game would be negligible.
- 128 Page V-1 (4th pp) - Eliminate, "Perhaps decades or even centuries." The length of time for recovery is unknown, and undocumented. Also, while microclimate changes (slope, aspect, etc.) will alter the premining vegetation mosaic, the result of proper reclamation and natural succession will be the establishment of a new mosaic which would not be foreign to the region. In turn, the carrying capacity for livestock grazing can be replaced or increased. While specific wildlife species may not be able to utilize the area in the same manner as is currently the case, a statement saying that the overall wildlife carrying capacity would be irreversibly reduced is erroneous.
- "Several plant species necessary to some wildlife would be difficult to reestablish." This does not state that some species planted will more than adequately substitute for the native species, and also assumes that more of the adjacent habitat is available for additional use.
- 129 The statement, "Mule deer winter range would consequently be reduced by about 400 acres." This statement should be deleted or at least revised since mule deer are seldom, if ever, seen in winter on the permit area (ECON).
- 130 Page V-(2) (1st pp) - The number of the increase in population is perhaps overstated and again not documented.
- 131 Page VI-1 (3rd pp) - states, "The local short-term use of the Big Sky Mine permit area would lower its long-term biological productivity. The geomorphic instability and erodibility of the reclaimed land surface (894 acres) would result in a loss of topsoil and a decrease in potential productivity." Peabody's proposed mine and reclamation plan has been drafted to achieve quick biological productivity capable of meeting the bond requirements with a ten (10) year time frame. Postmine reclamation contours as proposed will add geomorphic stability and will reduce the potential for erodibility on the reclaimed land, thus preventing or minimizing loss of topsoil and the decrease of potential productivity. Also, "Water infiltration on the reclaimed land surface would decrease, causing increased runoff and sedimentation for an unknown period of time." With the improved soil moisture holding capacity, the water will be better utilized by vegetation rather than allowing the infiltrated water to percolate into the subsurface and be discharged as springs adjacent to the disturbed areas. It appears this paragraph should be reworded to indicate that there will be beneficial long-term productivity for the Big Sky Mine area.

- 128 Page V-1(4th par.): Comment noted. The length of time, although unknown, is not 1 day or 1 year. Based on the information available, and on the climatic conditions in the region, decades or possibly centuries is possible.
- 129 Comment noted. The statement "... mule deer are seldom, if ever, seen in winter on the permit area (ECON)" is contradicted by the previous company comment [in reference to, page III-21 (G)(1)] that "1,7 separate observations were made in the winter (19, 6) at the Big Sky mine."
- 130 Page V-2(1st par.): Assuming that Peabody again left out the ancillary population in its projections, this estimate is the best available at the time, given the constraints in computer modelling. Documentation is provided in chapter III of the draft. (See response 120.)
- 131 Page VI-1(3d par.): Reclamation experience in the northern Powder River basin has not been extensive enough to support these contentions. Documentation of conclusions is provided in chapter III.

CHAPTER VII

132

Page VII-1 (1st pp) - As stated, "Reclamation of this area, especially for environmental factors, such as soils, vegetation, and wildlife, would take many years, decades, or even centuries to accomplish." This statement is not documented, and if it can be, should be noted.

132 Page VII-1(1st par.): All documentation for chapters V, VI, and VII is provided in chapter III. These chapters are summaries only.

133

Page VII-1 (3rd pp) - states, "The total dissolved-solids concentration in water from the resaturated spoils would probably increase to 3,880 mg/L from premining levels of 1,270 mg/L." Additional documentation is necessary before stating that groundwater within the three (3) groundwater aquifers will be degraded to the levels stated in this chapter. There are indications that isolated pockets of poor water quality may exist; however, that the entire disturbed area will not reach these levels is documented for the existing mine site under current conditions. In addition, it is stated, "Stream channels flowing over regraded highwalls and across reclaimed spoils would irretrievably alter erosional and depositional characteristics of the minesite." This may be the case; however, it may also irretrievably and beneficially alter the erosional and depositional characteristics of the mine site.

133 Page VII-1(3d par.): This statement refers to the water quality in the spoils, not in the aquifers.

134

Comment noted.

134

135

Page VII-1 (5th pp) - Based on a submitted mine and reclamation permit application, productivity capacities of the reclaimed soils will be as good as, or greater than, premine conditions. In addition, based on the proposed mine and reclamation plan, it is believed the vegetation mosaic and species diversity will be replaced to approximate premine levels.

135 Page VII-1(5th par.): Comment noted.

136

Page VII-2 (1st pp) - Potential raptor nesting sites and winter range of mule deer would be eliminated. Although a very few potential raptor nesting sites may be eliminated, it should be stated that data suggests a substantial increase in small mammals which in turn attracts raptors and raptors utilize the more open areas for hunting. How can the winter range of the mule deer be eliminated when mule deer are seldom, if ever, seen on the permit area during winter?

136 Page VII-2(1st par.): See response to comments page III-21 (C)(4), comments and responses 115.

137

Page VIII-10 (D)(3)(a) - The present coal storage barn is unventilated and controls better than 99% of the potential emissions. Venting the stockpile to a baghouse could actually increase the actual emissions to the open air.

137 Page VIII-10 (D)(3)(a): Comments noted. Data are insufficient to answer these questions.

CHAPTER VIII

The present coal crushers are both enclosed and sprayed with water. Coal conveyors were completely enclosed until Peabody was directed to cut the bottom out by MESA. Losses in weight by coal cars between loading and unloading points cannot be attributed to coal loss. Coal losses cited by the EIS author are inappropriate. The truck

Chapter VIII (con't)

- 137

dump is presently equipped with a water spray unit. Would the installation of a negative dump increase or decrease emissions over the water spray?

In addition to the problems raised in the Chapter II comments, how would heavy oil on coal affect the power plant crushers and fuel injectors in the boiler? Would heavy oil on coal be incompatible with the present design? What kind of water pollution problems arise? Nimerick and Lafin did not use an oil spray on coal, rather they used an unknown plastic binder. What air pollution problems would result from the combustion of plastic in large quantities in a power plant?
- 138

Page VIII-10 (D)(3)(b) - Topsoil stockpiles, by nature, are active. Stockpiles that are to be inactive for a long period of time are and will be seeded to prevent wind erosion. What effect would mulching have on the quality of topsoil? Roads are presently reclaimed as they become unnecessary.
- 139

Page VIII-10 (D)(3)(c) - Drill cuttings are presently used as packing in blast holes. Drilling dust piles would not be in existence very long since blasting is done as soon as possible. Additionally, packing fine dust in the blast holes would result in injecting much greater quantities of dust higher into the air when the charge is set off.
- 140

Page VIII-10 (D)(3)(d) - A mass transit system for mine employees would reduce traffic emissions. Some questions would have to be answered however. Who would purchase, maintain, and be liable for the bus? Would the miners use the service? Would the miners demand pay from the time they got into the bus until they got off the bus? Also, by decreasing the amount of coal hauled in each load, this automatically requires more trips to convey the same amount of coal. Would the increased exhaust emissions and road dust emissions be justified?
- 141

Page VIII-10, -11 - A sampler placed downwind of mining activities would give information about mining impacts. However, as noted in the EIS, "...since this is a place where people and agricultural activities are located," the agricultural activities and unpaved roads located immediately east of the permit area would contribute significant amounts of dust to the amount measured by the sampler.

The substation air monitor is generally considered as the upwind sampler and used as a baseline for comparison with the other monitors. Removal of this monitor would result in a loss of the main reference point. What other monitor with a long period of record would replace this reference?
- 142

This comment was taken out of context. It is preferable to leave all monitors intact; however, "if any air monitors had to be removed," those removed should be those providing the least valuable data.

- 138

Page VIII-10 (D)(3)(b): Mulching would not have a negative effect on topsoil.
- 139

Page VIII-10 (D)(3)(c): Comment noted.
- 140

Page VIII-10 (D)(3)(d): The answers to these questions are unknown; they are not the responsibility of this EIS. It is obvious, however, that mass transit is more energy efficient.
- 141

Page VIII-10, -11: Comment noted.
- 142

This comment was taken out of context. It is preferable to leave all monitors intact; however, "if any air monitors had to be removed," those removed should be those providing the least valuable data.

Chapter VIII (con't)

- 143** The powder magazine air monitor has been regarded as the downwind sampler to measure the impact of mining activities. Would not this site be the most valuable in monitoring the air quality impact on the mining continues?
- 144** Does the attainment of the National Ambient Air Quality Standards require regulations to reduce dust from coal mines only? Could not offsets be achieved at sources other than at the Big Sky and WECO mines?
- 145** Almost any source of particulate exceeds the air quality standards if measured closely enough to the source. Figures II-9 and II-10 of the EIS show concentrations of TSP at monitoring Site #4, the "downwind" monitor. The #4 monitor shows an annual concentration only slightly above the upwind #1 monitor and well below the standards. No violations of the 24-hour secondary standard were recorded at the downwind site. Where are the standards applicable?
- 146** Page VIII-11 (D)(4) - Noncapability of reintegration into normal land use patterns has not been substantiated by Chapters II and III of this statement or the current reclamation of the Big Sky Mine. Therefore, monitoring above and beyond the current level is unwarranted.
- 147** Page VIII-12 (D)(4)(1st pp) - The first sentence has not been substantiated by this report and should be deleted.
- 148** Page VIII-12 (D)(4)(1) - It is doubtful that "soluble magnesium" can be demonstrated and documented to be a problem at Big Sky Mine. Furthermore, magnesium is an important component of plant chlorophylls.
- 149** Page VIII-12 (D)(4)(2) - These "serious problems" have not been demonstrated by this report or by past history at Big Sky Mine. The statement should be deleted.
- 150** Page VIII-12 (D)(4)(3) - With a minimum 27" of topsoil which could be placed on the graded areas (ECON, Inc.) neither maximizing nor the intensive monitoring needed for minimizing, can be justified.
- 151** Page VIII-12 (D)(4)(4) - Erosion has not been demonstrated adequately by this report to substantiate a terracing proposal. While salvaging the Ringling channery loam may provide habitat for Ponderosa Pine, it would be unwarranted to require vast terracing for a plant community which contributed only 18% to the overall site prior to mining.
- 152** Page VIII-12 (D)(5)(a)(1) - states, "Apply fertilizer, if indicated by test results..." and if the plants being established on the graded
- 143** This is a decision to be made by Peabody in conjunction with DHES and EPA.
- 144** No; requirements are the responsibility of DHES and EPA.
- 145** Comment noted. Unfortunately the only data for Big Sky to work with are those from the minesite monitors. For purposes of comparison, air quality standards were used. Standards are applicable to "ambient air"; however, Peabody is not monitoring "ambient air."
- 146** Page VIII-11(D)(4): Substantiation in chapters II and III is not a prerequisite to monitoring requirements.
- 147** Page VIII-12(D)(4)(1)(1st par.): Comment noted.
- 148** Too much of a good thing (soluble magnesium) can be as adverse. It was not stated that magnesium is a problem, only that high levels are found in the C horizon soils.
- 149** Page VIII-12(D)(4)(2): It was not stated that these were serious problems at Big Sky. Replace "otherwise serious" with any.
- 150** Page VIII-12(D)(4)(3): Maximizing and minimizing will enhance the success of reclamation.
- 151** Page VIII-12(D)(4)(4): Adequate substantiation of erosion is impossible, based on the data available. Vast terracing was not suggested.
- 152** Page VIII-12(D)(5)(a)(1): The comment is unclear.

Chapter VIII (cont)

152

topsoil areas would not, over the 10 year required reclamation time, naturally fertilize the soils, could cause the ill effects of over-fertilization and undue expenditures for problems which can be naturally corrected.

153

Page VIII-13 (D)(5)(a)(2) - This statement conflicts with the molybdenum suspect level (0.3 ppm) stated in Table II-1, p. II-5.

More importantly, such a topsoil restriction cannot be justified by the actual soil plant relationships nor by the past cases of molybdenum toxicity.

154

Page VIII-13 (D)(5)(b)(2) - Mule deer are seldom, if ever, seen in winter on the permit area.

155

Page VIII-13 (D)(5)(b)(3) - There is nothing from the seed producers or the plant material centers which would indicate that inoculating 48 hours prior to planting is superior to inoculating even up to 6 or 8 months prior to planting. Furthermore, in some cases, the natural fertilizing effect of legumes would be sufficient fertilization. "Experience elsewhere" is not defining an actual corresponding case. Furthermore, phosphorus is a pH related problem. Since both phosphorus and plant roots require a narrow pH zone centered on a neutral pH, it would stand to reason that a small zone around each root is created that would allow phosphorus to become soluble. Once legumes are established phosphorus may be in a more soluble state for other nonleguminous species.

156

Page VIII-13 (D)(5)(b)(4) - Considering that even with cross-seeding, drill rows can be seen for numerous years after plant establishment. The difficulty of traversing roughened surfaces and uneven terrain without damage to seeding equipment, and the slope restrictions of a drill seeder (should the aforementioned terracing be imposed) a drill seeder should be considered only as secondary planting equipment to be used for interseeding areas with sparse growth from the first seeding attempts.

153

Page VIII-13(D)(5)(a)(2): Table II-1, as stated, is State suspect levels. Page VIII-13 refers to a BLM suggestion for a suspect level.

154

Page VIII-13(D)(5)(b)(2): This contradicts previous statements by Peabody. See comments and responses 129 and 115.

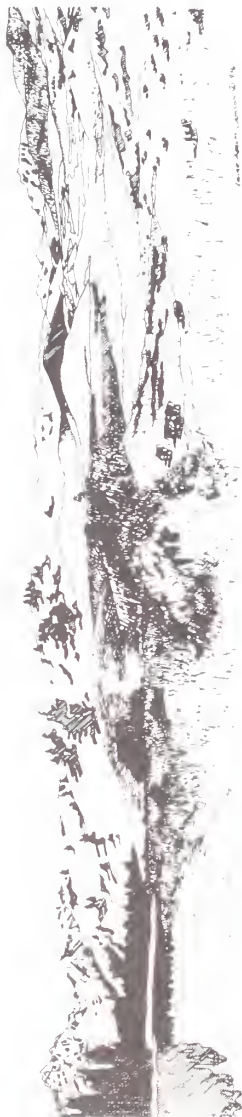
155

Page VIII-13(D)(5)(b)(3): Comments noted. It has not been documented that Big Sky is one of the cases in which the natural fertilizing effect of legumes is sufficient.

156

Page VIII-13(D)(5)(b)(4): Comments noted.

LETTER 22



Environmental Information Center Box 1184, Helena, MT 59601 (406) 443-2520

February 5, 1979

Mr. Leo Berry, Commissioner
Montana Department of State Lands
Capitol Station
Helena, MT 59601

Dear Mr. Berry

The following comments and questions refer to portions of the draft environmental statement Big Sky Mine Expansion published jointly by DSL and the U.S. Dept. of Interior. Please respond to these notations with an explanation which would allow us to more clearly understand the document.

Hydrology - Chapter 11 - pg. 11

- 1 How does Miller Coulee hydrology relate to Emile Coulee hydrology?
- 2 How much water is the "considerable amount" encountered from the sandstone bed?
- 3 How much water is used to supply the water truck? If it is less than the "considerable amount" encountered earlier (before October 1978), why was there a decrease in pit inflow?

How much pit inflow can be expected in Emile Coulee?

- 5 How can Decker figures be used to estimate pit inflow at Big Sky, particularly when mining at Big Sky produces 5 to 6 feet of drawdown in the sub McKay and mining at Decker produces 40 feet of drawdown?

Air Quality -

11-18 - Why is fugitive dust inadequately monitored?

- 7 11-22 - Why isn't Peabody using the best available control technology to mitigate dust emissions?

General Subjects -

- 8 pg. 1-18 - Seed mixtures listed as a means of preventing the invasion of undesirable species do in fact contain undesirable species such as alfalfa, sweet clover and crested wheat grass. The legumes mentioned above accumulate molybdenum and the crested wheatgrass tends to cause selective (over-) grazing or requires more intensive grazing rotation than should be necessary. However, all of the above species are photogenic and useful for public relations. Please discuss their effectiveness in the Peabody reclamation program.

- 1 Page II-11: Underflow from Emile Coulee contributes to the underflow of Miller Coulee. Reduction in the contribution of underflow from Emile Coulee would not have significant impact on the underflow in Miller Coulee.
 - 2 As stated in the first full paragraph on page II-11, "as much as 1 million gallons per day."
 - 3 The reduction in inflow is due to the movement of the active pit into an area where only a small part of the overburden aquifer was saturated.
 - 4 Inflow into the pit in Emile Coulee is projected to be a few tens of gallons per minute.
 - 5 The Decker figures are simply an example of how small the flow from the coal into a pit can be even with substantial head.
 - 6 Page II-18: Fugitive dust is inadequately monitored because the equipment that is used to estimate dust concentrations in the air may not relate to human health effects. High volume air samplers are often weighing particles that are much too large to breathe and give no indication whether or not respirable particles are present in concentrations injurious to human health. Small particles also decrease visibility. Since ambient air quality standards for particulates are based on this sampling method, TSP measurements are the only long-term data we have to analyze the particulate problem in eastern Montana. Hence, the dust problem is poorly understood.
- Additionally, all the high volume air samplers are placed within the leasehold boundaries at the Big Sky mine and other mines. This makes it extremely difficult to assess (let alone regulate) the fugitive dust problem downwind from the mine.

Mr. Leo Berry
February 5, 1979
Page Two

9 pg. 1-19 - We do not believe that used mining equipment should be buried in the mine area. Does the state inspect each piece of equipment to determine its longterm influence or groundwater quality?

10 pg. 1-20 - The reclamation contour map does show a number of depressions which would collect water at elast part time. Such water holes at Peabody have a had reputation for trapping cattle in the mud. Also, what is the expected water quality in such depressions?

11 pg. 1-21 - The document states that reclamation work will be monitored by company employees. Hopefully, this does not alleviate the state of the responsibility to annually document the progress (or lack of) of reclamation in terms of vegetative changes and soil stability or erosion. Does the Department feel responsible to maintain a diligent monitoring of reclamation?

Your clarification of these notations and questions is greatly appreciated.

Sincerely,

Bob Kiesling

BOB KIESLING
STAFF DIRECTOR

7 Page 11-22: BACT is site-specific control technology and defined by EPA on a case-by-case basis. EPA has not yet defined BACT for the proposed Big Sky mine expansion. BACT is not the same as best technology currently available (BTCA), which was used in the draft (volume I) to evaluate the company's proposal.

Although the dust mitigation techniques proposed by Peabody Coal Co. are not all best technology currently available (BTCA), the Air Quality Bureau of the Montana DHES and EPA must review their permit and decide what will be required. If Peabody doesn't use BTCA, it will be because the Air Quality Bureau does not require them to do so.

8 Page 1-18: Although the likelihood for alfalfa to accumulate molybdenum is not thoroughly understood, yellow sweetclover is believed to be much less problematic than white sweetclover and could probably be safely used. For the reasons mentioned plus its superior competitiveness, crested wheatgrass would likely be unacceptable to Montana Department of State Lands and BLM.

9 Page 1-19: The State does not inspect each piece of equipment to determine its long-term influence on ground-water quality.

10 Page 1-20: The analysis of these depressions is provided in chapter III of the draft (volume I) under Geomorphology, Soils, and a number of other sections. The revised plans submitted by the company eliminate depressions having a holding capacity of more than 1 cubic yard.

11 Page 1-21: Monitoring of reclamation by company employees in no way precludes monitoring by the Department of State Lands. The Department of State Lands is monitoring and will continue to monitor reclamation.

LETTER 33

PATTY KLUVER

Route 1
Forsyth, Montana 59327
February 2, 1979

Director
U. S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092
Dear Sir:

Re: Proposed Expansion
Mining & Reclamation Plan
Big Sky Mine, Rosebud Co.,
Montana--PEABODY COAL CO.

It is my understanding that the Draft EIS provided by Peabody Coal Co. is composed to present an outline and facts regarding the benefits and adverse environmental results of the proposed operation. This EIS reminds one of the adage, "The operation is a success, but the patient is dead!"

The Federal Government has an obligation to adjoining landowners, to any landowners who might be adversely effected by the coal mining of the Rosebud aquifer, and the McKay aquifer. This draft EIS is a better job of window dressing than usual, but it has not addressed the adverse environmental effects of nearby businesses, those of ranching.

For example, in the Summary of adverse, unavoidable environmental impacts, (P. iii, No. 3, Items B. and C.:

B. It is uncertain that former vegetative productivity levels can be reestablished. There would be a loss in vegetative diversity for possibly several decades.

1 4.1. When the mining co. has abandoned the operation, with no reclamation achieved, who will assume responsibility for continuing reclamation efforts.

2 Who will claim the abandoned land for taxes, and will the County and State obtain an compensation in lieu of taxes?

3 If the environment of an adjoining property is jeopardized even ruined as a result of coal-stripmining, what assurance has that landowner that he will ever receive just compensation in land or in money? That very real probability has never been addressed.

C. Existing local aquifers would be destroyed; the returned spoils, where saturated, would contain water of poor quality unsuitable for domestic or livestock use.

1 The company cannot abandon the operation until the reclamation requirements of the Montana Strip and Underground Mine Reclamation Act of 1973 and those of the Surface Mining Control and Reclamation Act of 1977 are met.

2 The land would revert to its legal owner who must pay any applicable county and State taxes.

3 The landowner is entitled to the same protection under the law, and has the same assurance as any citizen, that his property will be protected against jeopardy and that wrongful loss would be compensated.

PATTY KLUVER

Route 1
Forsyth, Montana 59327

4 Certainly, the Director will understand that good water is essential to the Agricultural businesses of the Northern Great Plains. Yet, already there is every indication that water, a non-renewable resource has been jeopardized as a result of coal strip mining. For example, the following was taken from the U. S. Geological Survey, (Water Resources Investigations 77-80) titled "WATER QUALITY OF SELECTED STREAMS IN THE COAL AREA OF SOUTHEASTERN MONTANA, prepared in cooperation with the U. S. Bureau of Land Management and the U. S. Environmental Protection Agency.

Under the sub-heading, Rosebud creek, above Pony creek, near Colstrip, (pns. 34-35) is the following excerpt:

"Of all the constituents, only the concentration of dissolved arsenic showed an anomaly. It was analyzed from the March 5, 1965 sample, and had a moderately high concentration of 28um/l. The sample was collected at a high flow when the relative proportion of runoff was high. Unfortunately, this sample wasn't analyzed for any of the other total and dissolved solids."

Other total and dissolved solids may, and probably ARE listed on page II-21, of the Draft EIS about which this letter is addressed. They are, for example, in the Very High Concentration list: Arsenic, Beryllium, Copper, Lanthanum, Lithium, Niobium, Fluorine, Zinc, Lead, and Magnesium. In the Moderately high concentration list is Cobalt, Gallium, Molybdenum, Nickel, Scandium, and Vanadium.

5 To date, there has been no competent study conducted to arrive at the adverse effect coal strip-mining will have on off-side businesses such as Agriculture. Only the actual mining properties ~~were~~ studied, and they were mis-directed and mis-interpreted.

6 For example: Page II-11 reports "a considerable amount of water in a box cut, in Miller coulee in Sec. 22, which came from a thick sandstone bed. This bed constitutes almost all the overburden in this part of the mine. Pumpage from the mine at this time was as much as 1 million gallons per day. Most of this water was discharged in to an old mine pit to the south in Sec. 27, where it was lost by evaporation and downward seepage."

Any Hydrologist with the common sense of field mouse would recognize the following: The sandstone the reservoir for the coal aquifer beneath it, during the years when Peabody Coal mined the coal at the lower end of the coal bed, and the lower end of the syncline.

4 Water quality would deteriorate significantly only in the spoils; any loss in quantity, or utility, of water supplies related to the mining would be compensated as required by the Surface Mining Control and Reclamation Act of 1977. Good water is available from the sub-McKay aquifer. Only lead exceeds drinking water standards in overburden or spoils water. The presence of elements in "high" or "moderately high" concentrations in the overburden and coal does not mean that these element concentrations will be high in the water. The offsite effect of mining on water quality is being monitored by the Montana Bureau of Mines and Geology. No offsite effects have, to this date, been observed.

5 Page III-8 (B)(3) discusses the only potential impact of this proposed mining expansion on agriculture.

6 The hydraulic connection between the sandstone and the coal is recognized and, of course, implicit in the statement, "This 'water * * which came from a thick sandstone bed' and 'This bed constitutes almost all the overburden * * *.' Also, see paragraph four, last sentence, page II-9, and the last sentence on page II-9.

LETTER 23

PATTY KLUVER

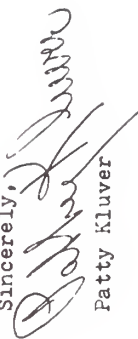
Route 1
Forsyth, Montana 59327

6 Since I have a business to conduct, from which I pay my taxes and derive a living, I have little time to devote to the critique of this EIS, and will conclude on this note:

At stake are three (3) non-renewable resources, the land, the coal, and the water of a vast region. In exchange, for a pittance, the government will receive a few brief years of "Energy Self Sufficiency, MAYBE.

If, however, the decision is made to lease the minerals of the Federal government, those addressed in this EIS, the questions put to the reader on the first page should be answered. Since the site from which the anomaly of arsenic ~~was~~ removed is on our family ranch, I would hope some personal attention to the problem will be forthcoming.

Sincerely,



Patty Kluver

January 15, 1979

Director
U.S. Geological Survey
National Center
Mail Stop 108
Reston, Virginia 22092

Dear Sir:

In response to my review of the DES entitled "Proposed Expansion of Mining and Reclamation Plan, Big Sky Mine, Rosebud County, Montana", I would like to submit the following comments.

1 It seems evident that the authors of this DES did not adequately and/or correctly review the wealth of wildlife data supplied by the Environmental Consulting Service, Inc. of Helena, Montana. ECON has conducted research on the Peabody Big Sky Mine continuously from 1974 until present and have produced a report annually. On pages II-28, III-21 reference is made to use of the mine area during spring and summer antelope migrations on preferred migration routes. There is no evidence provided in ECON's reports to support the conclusion that preferred migration routes are through the proposed mine expansion area. Since it has not been established that migration routes are through the mine area the conclusion that migrations will be disrupted by mine expansion is unfounded.

2 On pages II-42 and III-22 reference is made to Ponderosa pine as a preferred habitat for the Hungarian partridge. I would be interested in reviewing any data to prove such a statement. The reports by ECON do not provide evidence to support such a statement and I am sure the bulk of the evidence in the literature will indicate a cropland or grassland-shrub habitat to be preferred by "huns". Contrary to the authors' statement, successful reclamation may very well enhance the Hungarian partridge carrying capacity.

3 Since over a four year period ECON has not recorded an observation of white-tailed deer on the mine site, it seems unlikely that they will shift their range to the Miller and Emile coulees and to Rosebud creek in response to mining activity as stated on pages III-21.

4 On page III-22 reference is made to a possible reduction in breeding activity on two sharptail grouse leks within one mile of the extending mine. Two sharptail leks have recently been established near the reclamation on the Western energy mine, one of which is within 1-1 1/2 miles of the Peabody mine. Both have been documented by ECON. Studies done in South Dakota in conjunction with the soil bank program have indicated sharptails have a propensity to establish leks upon or adjacent to these areas. Up until the reclamation bond is released and possible land changes occur, it is likely

1 See response to Ecological Consulting Service, letter 19, response 7.

2 Page II-42 states that the preferred habitats are "upland shrub, grasslands, and ponderosa pine." Insert: in order of decreasing preference. Since the reclamation does not include cropland and the reclamation of upland shrub is not yet extensive, it is premature to state that reclamation would enhance Hungarian partridge carrying capacity.

3 Delete this section from page III-21.

4 Page III-22 (C)(6): Insert at end of first paragraph: It is also possible that sharptail numbers will increase on the reclamation area.

LETTER 24

Page 2

4 sharptail numbers will increase on the reclamation area.

Thank you for the opportunity to comment

Sincerely,



Greg Pallister

2736 Spaulding Ave Rd
East Helena, Montana 59635

(copy)

Stan Walthall
709 9th Ave, #3
Helena, MT 59601

Leo Berry, Jr., Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59601

February 5, 1979

Dear Mr. Berry,

Please find enclosed my comments re: The Proposed Expansion of Mining and Reclamation Plan, Peabody Big Sky Mine, D.E.I.S.

Overall I thought the DEIS above average, however the sections dealing with social impacts seem significantly lacking in meaningful analysis. This may be a result of the contract and contracting process through which the social impact analysis was completed.

Also would you include these comments as a part of the official public comment. I understand that today is the last day to receive such comments.

Thank-you.

Sincerely yours,



(copy)

Comments on the Peabody Big Sky Expansion DEIS

The Big Sky Expansion draft EIS does not adequately assess the social impacts that may result if the expansion is approved. Chapter II, "Environment" does not adequately describe the existing social environment in which the action would be approved. Similarly, chapter III does not adequately assess the impacts to society from the proposed mine.

My comments are limited to sections dealing with sociology, and follow the section headings of their respective chapters.

Chapter II. Environment

The purpose of this chapter is to describe the existing, in this case, social environment in which the proposed action would be implemented. An adequate description of the existing social environment is not present! Why not?

1 1. Population. An analysis of the population should describe the historical trends and population growth and distribution. Growth trends from 1950 are discussed for Rosebud County alone. Why were the growth trends for the towns of Forsyth and Colstrip not discussed? The thirty year period used for the county population change is not enough to describe the long term overall trends of the population. What has been the rate of growth by year since 1960? Table II-13 is missing the "Urban" portion of the population. What percentage of the population was urban in 1976? A graph showing population growth would be useful. Why are there no percentage rates of change for the total population and components in tables II-12 and II-13?

2 In addition to the growth and distribution of the population, an adequate description should include the characteristics of the population in terms of sex, age, and ethnic composition. Data was given for this in the two tables mentioned above. What do these numbers mean? What is the sex ratio? What percentage (proportion) of the population is elderly (60 and up)? What percentage (proportion) are school age or dependent? What does it mean in terms of social impacts? Why is there no population analysis for Colstrip, Forsyth, Ashland and Lame Deer?

3 2. Social structure. An analysis of social structure would be very useful in assessing the social impacts of the proposed mine. Where is the description of the existing social structure?

Social structure is not adequately defined! Social structure refers to:

"the pattern of interrelated statuses and roles found in a society or other group at a particular time and constituting a

1 Population: This is an analysis of the expansion of an existing operation; it is not an analysis of a new operation. Historical trends were discussed in analyses of the opening of existing mining operations and the permitting and construction of the generating units.¹ Historical trends were so radically reversed in the late 1960's and early to mid-1970's that a detailed review is not pertinent to this analysis, either for the county as a whole or for the specific communities within the county.

Data were not available on an annual basis from 1960 on; the average annual rate can be calculated from the data given in tables II-12 and II-13. Table II-13 is not "missing" the urban population. It was not broken down into urban and rural. The 1976 urban population was 0, or 0 percent of the total.

The percentage rate of change was not significantly affected by the Big Sky mine.

2 See table II-13. The sex ratio for 1976 is: $(5,121/4,457) \times 100 = 114.9$.

Sixty-five was used as the breaking-off point in this analysis. The proportion of persons 65 years and older is presented in tables II-12 and II-13. The percentage is $(557/9,578) \times 100 = 5.8$ percent.

The proportion of school age children is given in the category "5-17" in these tables. The percentage of persons 5-17 is $(2,542/9,578) \times 100 = 26.5$ percent.

See Community Services for the implications.

3

relatively stable set of social relations. It is the organized pattern of interrelated rights and obligations persons and groups in a system of interaction as analyzed in terms of status, roles, social norms and social institutions. The term social organization is sometimes used synonymously with social structure (emphasis mine) from: Theodorson, et al, A Dictionary of Sociology, New York: T. Y. Crowell, 1969, p. 395.

Where is the description of statuses, roles, social norms, and social institutions? Where also is the description of the organized pattern of interrelated rights and obligations of persons and groups? How is local society structured? How is the society of the newcomers (who are already there) structured? How do these structures differ from the local populations. What is the structure of the Northern Cheyenne's society?

Social structure alone is not enough to understand how a society is possible. In assessing social impacts it is essential to understand what the past and present impingements upon social conditions and processes are, and to project the likely future of the consequences of the proposal upon the social interactions and relationships between and among people (after the definition, by the Social Impact Assessment study group of the American Sociological Association). It is clear that this chapter does not lay the ground work to analyze these aspects of society by adequately describing the existing environment.

By the definition given in the text (page II-43) it may be possible that instead of formal and informal "associations", it was meant formal and informal "groups". Sociologically association refers to a formal group organized for a specialized and specifically stated purpose (Theodorson, 1969). Or does it refer to: "a relatively enduring pattern of interaction"? It is not clear. The analysis does not shed any light on the answer as it describes neither.

What community values are "these associations" indicative of?

a. Colstrip. Colstrip has an interesting history, and because of its past and because of the present conditions, has a unique social organization. Why was this not discussed? How is life organized in Colstrip? What is the relationship between newcomers and old time locals? What different formal and informal social groups are there? What are the statuses, roles, norms, and patterns of organized behavior? What is it that makes life worthwhile, meaningful, and purposeful for those living in the town? What is the relationship between townspeople and ranchers adjacent to the townsites? How do people recreate? Does that play an important social function?

2

¹Energy Planning Division, Montana State Department of Natural Resources and Conservation, 1975, Final environmental impact statement on Colstrip electrical generating units 3 and 4, 500-kv transmission lines and associated facilities; U.S. Geological Survey, 1974, Proposed plan of mining and reclamation, Big Sky mine, Peabody Coal Co., Federal coal lease M-15965, Colstrip, Montana: Final Environmental Statement FES 74-12; and other environmental statements for the area.

The distribution of Peabody employees is given on page II-43, the fourth paragraph. Given this distribution, the constraints of locating in Ashland and Lame Deer, and the dominance of Colstrip by Western Energy Co. employees, a detailed population analysis in these areas is unnecessary.

As stated on page III-23, "most impacts of population growth due to the Big Sky expansion would occur in Forsyth."

3

Social Structure: The description of the existing social structure is given on pages II-43 and II-46.

Your definition of social structure is noted.

Detailed data on social structure can be found in the references cited, in the previous EIS's covering the region, and in the regional analysis (DES 79-41). A treatise was not considered necessary for a decision to be made considering the small scale of the expansion. A detailed analysis of the structure of the Northern Cheyenne society is irrelevant to this analysis because the impacts would occur in Forsyth and not on the Northern Cheyenne Indian Reservation. This type of analysis more appropriately belongs in the regional analysis. See DES 79-41.

This portion of the EIS was not designed to be a treatise on the sociology of Rosebud County and the individual communities contained therein.

4

a. Colstrip: Colstrip's history and present conditions are not relevant to the expansion of the Big Sky mine, particularly since it is unlikely that more than four additional families would settle in Colstrip.

L:ITER

- 5 b. Forsyth. Forsyth is a much more important town considering that a greater number of Peabody miners live there than in Colstrip. However, the same questions asked about Colstrip are true for Forsyth. How do residents of Forsyth define their quality of life? What is it about living in Forsyth that people find valuable and meaningful? What effect did construction of Colstrip Generating units 1 and 2 have on the community? What effects will Peabody have on the everyday lives of residents?
- 6 c. Ranchers. The interpretation of the Gold report leaves out some of the important data: 1) there are two groups of ranchers, those favoring and those opposed, and 2) those opposed are highly organized in the Northern Great Plains Resource Council. Gold also stated that aside from the schools, the ranchers were the most severely impacted group. How are they impacted? Why are the ranchers divided in their perception of the effects of strip mining? What effect is this division having on the social organization of the natural rural ranch neighborhoods? If ranchers are feeling a loss of control and influence, are they losing it to a particular group?
- Chapter 111. Impacts
- 7 How much growth would occur in the Colstrip-Forsyth area? Why would it not place any noticeable demands on existing social structures? What is meant by "noticeable effects"? Would the ranchers feel their way of life was being further threatened, or would there actually be changes in their way of life? Who would benefit from immediate economic gains? How would the social costs be distributed among the population?
- 8 1. Population
- What are the yearly rates of growth from 1978 to 1985? Would they exceed the stable or moderate growth rate of 5 percent suggested by Gilmore and Duff? If so, when and by how much? What effect would this have on Forsyth, on Colstrip, on Lame Deer, and on Ashland? What would be the yearly growth rates for these communities? What effects would they have on each community's social organization?
- 9 How would the population characteristics change? At what rate would they change? Do the newcomers have different characteristics than locals, including newcomers who have been here long? What are the social implications of such differences,
- 5 b. Forsyth: Again, this is not a sociological treatise. This detail was not considered necessary to the decision process since the effect of the expansion is so small. A detailed analysis is available in the open-file report: Report to the Department of State Lands on the economic impact of the Big Sky mine expansion, 1978, Meadowlark Group, at the DSL offices.
- 6 c. Ranchers: persons interested in this detailed a description are referred to the citation: Gold, 1974.
- 7 Growth occurring in the Colstrip-Forsyth area is presented on page III-23, Population. Noticeable demands would not be placed on the existing social structure because of the small increases in population resulting from this mine expansion. Noticeable effects would be significant and measurable. See page III-23 for the effects on ranchers. Page III-24, table III-4 shows who benefits from the economic gains. The distribution of social costs due to the Big Sky mine expansion alone are probably unimportant as they are too small to measure.
- 8 Population: Annual rates of growth can be calculated from table III-3 and are generally less than 3 percent per year. The effect of this growth on Forsyth would be relatively minor and little effect is expected on Colstrip, Lame Deer, and Ashland, as explained on page III-23. Consequently, there would be little effect on each community's social organizations.
- 9 The expansion of Big Sky is too small to significantly change population characteristics. Therefore, the remainder of your comments are not pertinent to the analysis.

LETTER 25

2. Social Structure

10 Where is the analysis of social structure? Given the statement that impacts will be hardly noticeable, where is the evidence backing up this conclusion?

11 What are the value conflicts already evident? What are the differences in the ways of life of the rancher and the miner? What aspects of their respective ways of life are "incompatible"? Are the ranchers alienated? Where is the evidence? How will the residents of Forsyth and Colstrip become alienated? What effect will alienation have on their psychological health?

Conclusions

12 In light of the existing analysis, how can you draw the conclusion that "This growth is not likely to have a noticeable effect on the existing social structure." Whose social structure would not be affected? Given the definition in the DEIS, and given the definition from the Modern Dictionary of Sociology, the analysis of social structure in particular, and social impacts in general is lacking. Will a decision be made to approve the Big Sky Expansion with the awareness that you do not know what the social impacts will be?

10 Social Structure: See page III-23 and responses to your comments regarding chapter II.

11 Value conflicts are summarized on pages III-23 and III-24. The differences in the way of life of the ranchers and the miners are irrelevant since the Big Sky mine expansion is too small to affect these differences. The incompatibility is not the subject of this EIS, nor is the alienation of the ranchers and residents. This is discussed by Gold (1974) and is summarized in numerous EIS's covering the opening of mining and the generation of electricity in the area.

12 Because the growth is so small, no one's social structure would be affected. A decision will be made in the knowledge that the social impacts would be negligible, both due to the small amount of growth due to the expansion alone and due to the amount of growth relative to other projected activity in the area.

CHAPTER X

REFERENCES

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DEPARTMENT OF STATE LANDS

L STATION, HELENA, MT 59601

THOMAS L. JUDGE, GOVERNOR

7-2074

LEO BERRY, COMMISSIONER



July 16, 1979

CHAPTER XI APPENDIXES

Certified Mail No. 22078
Return Receipt Requested

APPENDIX A

Mr. Terry O'Connor
Peabody Coal Company
Rocky Mountain Division
Campus 6, Suite 600
12015 East 46th
Denver, Colorado 80239

LETTER FROM THE MONTANA DEPARTMENT OF STATE LANDS TO PEABODY COAL COMPANY

RE: Application for Permit No. 00057

Dear Mr. O'Connor;

The department has reviewed your application for permit (submitted 11/21/78 and revised 6/18/79) for compliance with the Montana Strip and Underground Mine Reclamation Act, the Rules and Regulations adopted pursuant to this Act, the Coal Conservation Act, and the rules adopted pursuant to the Coal Conservation Act.

Peabody's application is deemed not complete at this time. The department has listed specific deficiencies in your application. Each deficiency should be addressed with a positive commitment in your revised application. All revisions must be in the form of complete replacement pages or plates. To avoid confusion, please label each replacement page with the word "Revised" and the date of revision. Due to time constraints, the Office of Surface Mining's (OSM) comments have not been included. OSM will draft comments after it has had an opportunity to review the department's attached comments and these will then be forwarded to you.

Review of your application has been inordinately difficult for a number of reasons. As I pointed out in the deficiency letter to Leonard Shearer on application 00073, dated November 30, 1978, Peabody's "stock" permit application is extremely hard to review. The attempt to update material originally written in 1973 has resulted in a format that is confusing and inconsistent. I would recommend that before Peabody's submittal of another application, that you totally rewrite the narratives for the site specific area.

Secondly, Peabody has inserted qualifications to many of the commitments made in the application. Such qualifications are often unacceptable; those that must be deleted have been noted. Montana's Act and rules

Mr. Terry O'Connor, Peabody Coal Company
Certified Mail No. 22073
Page Two
July 16, 1979

have sufficient flexibility so as to not make the performance standards unreasonable. Furthermore, the department has shown a willingness to work out site specific problems on a case-by-case basis with Peabody.

Finally, our review of Peabody's application has been badly hampered by trying to review an incomplete application. The department was aware before the review began that a new postmining contour map was being prepared. This was not received until three weeks ago, however. Also, in a meeting with Jim Lunan on June 12, it was indicated that the wildlife and revegetation plans were being updated. These have still not been received and hence cannot be reviewed by our staff. Likewise, Peabody was aware that the Archaeology was incomplete and has contracted for a new study. Review cannot proceed until the study is received.

Henceforth, if major portions of a permit application are missing, or being updated, the company's entire application will be sent back. We cannot adequately review an application that is being changed during the review period. Permit review requires integration of all the disciplines involved. We have a limited staff and a demanding workload. Good government is efficient government and incomplete submittals such as Peabody's severely hampers our efficiency.

VOLUME I

- (1) On Page 1, reference is made to new scoria pits in Section 27. It probably should read "Section 26". If so, this must be changed in the narrative.
- (2) Page 7, the department requests that Peabody include a series of wells to known aquifers as part of the reclamation plan in order to support the postmining land use. Stock dams will be considered if they can be shown to support their intended purpose, and either are constructed after drainage stability has been demonstrated or can be located where they won't interfere with drainage through the reclaimed surface.
- (3) Page 11, under "Overburden and Parting Removal", second sentence: Are all of the cuts covered by this application north-south cuts? If not, this part of the application, and all other parts, should be rephrased so that it applies to the operation covered by the application.
- (4) Page 12, under "Coal Loading and Haulage", last paragraph, delete the phrase in parenthesis. If BN wants the spur line left in, it or Peabody will have to specifically request it.
- (5) Page 13, Backfilling and Grading: Under "Completion of Operation", the fourth sentence should be replaced with wordage to the effect that "culvert and drainage structures will be removed and the drainage systems returned to their approximate original condition."

Exceptions to this provision will be submitted in advance to the Department for approval."

- (6) Page 14, in the third paragraph, the department has been limiting highwall reduction to a 5:1 slope due to problems that have been experienced on 3:1 reduced highwalls. The narrative should be changed to say that highwalls will be graded no steeper than a 5:1 slope. If steeper slopes are necessary in any area for any reason these should be detailed and justified.
- (7a) Page 14, under "Mining Sequence", in the last paragraph, the surface irregularities or small depressions mentioned here must be described in detail in order for the department to evaluate this proposal.
- (7b) Page 18, paragraph 1, Peabody's proposal to survey reclaimed topography is a good idea. Ideally, it should be done annually on the previous year's reclamation and the results of each survey submitted with the annual report.
- (8) Pages 17-20. The department would like Peabody to present the methodology utilized to design the postmining drainage system.

The department does not feel that the proposed drainage along the western highwall is in keeping with the approximate original contour. S10310(1)(c) states, "The postmining graded slopes must approximate the premining natural slopes in the area. . ." On page 20, paragraph 2, it is stated that "Peabody. . . will reduce highwalls and will backfill the pits adjacent to the recovery line. . ." It certainly appears as if the pit configuration is being retained along the western highwall.
- (9) On page 19, in the first paragraph, it is not clear if Peabody is proposing to construct small depressions or not.
- (10) Page 19, under "Materials Handling", third and fourth paragraphs: The words "when technically justified" must be deleted.
- (11) Pages 19 and 20, it appears that the last parts of page 19 and the first parts of page 20 are missing.
- (12) In reference to page 20, paragraph 2, the department attempts to be reasonable regarding the accuracy with which the postmining topography can be predicted and will cooperate with Peabody when minor modifications in the grading plan occur. However, there comes a point where variations in grading may no longer be considered minor and the question that will be asked is, did Peabody put forth a good faith effort to accurately predict its postmining topography? In any case, the department considers the projected drainage bottom to have the least flexibility for modification. If Peabody were to

err in projecting the postmining topography to the degree that the projected drainage design could not be met, a potential violation could ensue.

- (13) Page 20, under "Final Graded Condition", third paragraph, the proposal here apparently applies to an earlier application and not necessarily to the present one. It should be clarified or removed. If this paragraph is applicable to the present operation, then what do the two sentences beginning with "During a recent field visit to the Big Sky Mine. . ." mean in relation to the postmining topography? If Peabody is proposing to utilize existing resistant strata that currently influence drainage gradients to drop onto the lowered reclaimed topography, the Department would like to work in the field with Peabody to further discuss this issue.
- (14) Page 21, paragraph 2, in relation to the statement: "The proposed stream channel will be concave, where possible, in order to alleviate the possibility of creating a 'knick point'", Peabody should provide a longitudinal profile of the restored drainage system and point out why certain stream reaches cannot be constructed in a concave fashion.

The stream profiles supplied as exhibits L-1 through L-11 were not properly surveyed. The irregularities in the profiles indicate that the bottom of the drainage was not necessarily followed. Another set of longitudinal profiles showing the premining drainage gradient should be provided. For expediency's sake, Peabody may construct the new profiles from topographic maps if it can

spot check and field verify their accuracy using surveying methods. Peabody should use care to follow the bottom of the drainages when determining the profiles.

Peabody should specify a timetable for installation of the Miller Coulee sediment study, delineate where the equipment will be located and provide an annual reporting date, preferably in the annual report.

The department would like to evaluate the specific locations that convex stream channels will be created by the mining operation and the proposed ameliorative technique to be used. The entire reclamation plan should be approved before permit issuance; therefore, these issues should be resolved now. The department would also like Peabody to evaluate the topsoil types available on the mine site and their suitability for drainage reclamation. Generally, finer textured cohesive soils would provide greater stability along drainageways.

Does Peabody have confidence in its postmining topography maps so that once the company predicts a given drainage design it can produce the end product?

Regarding the mitigating measures for convex drainage profiles:

- A. Schumm and others associated with him have developed the "threshold" concept of drainages that indicates that if a drainage is steepened to a certain limit gullying will occur. Can Peabody conduct its "feathering" operation and yet assure the Department that it will not exceed the "threshold" of the drainage?

E. W. Lane developed a simple concept of reactions that occur with channel changes. The following is Lane's relationship:

QSD is proportional to QWS

Where: QS = bed load
 D = particle diameter
 QW = water discharge
 S = stream slope

The construction of a sharply convex drainage profile would be given a class 3 category of change; for a sudden increase in slope at a particular point, QS will increase. It follows that for any increase in stream slope the ability of the drainage to move particles increases. Thus the drainage can vacillate between wild increases in QS and severe alterations to the valley profile if the "threshold" limit is exceeded. How has Peabody evaluated these concepts in proposing convex drainage profiles?

- B. The department would not allow a permanent stockwatering impoundment as a solution to an otherwise oversteepened drainage profile because a dam would not be considered approximate original contour.
- C. Check dams would not be considered grading to the approximate original contour and would not be allowed.
- D. The department will not allow riprapped stream channels because riprap will be moved down the valley, and, without replacement or a continual supply of resistant materials, the valley would erode. A rancher would not have the time, money, nor inclination to maintain a riprapped structure.
- E. Granted, vegetation will help to stabilize the reclaimed surface. Our experience, however, has been that if the drainage system is not properly designed, even sodded vegetation cannot resist the erosive forces. The key appears to be to design your drainages using every bit of geomorphic knowledge available regarding stable drainages and then hope that the vegetation can get established to assist with stabilization.

F. The department would be happy to work with Peabody to plan mining into the bluffs in such a way as to alleviate erosional concerns in all cases except where important wildlife values occur in which case, mining may not be allowed.

- (15) Page 22, in the second paragraph, the reference to Chinook and Tullock soils should be changed, since these series names are not used in the revised soil survey.
- (16) Pages 22-23, Peabody has presented some general ideas regarding data collection on the mine site. More specific techniques should be described under "Methods" for review by the Department. We do believe the objectives of this work are worthwhile.
- (17) Page 23, Peabody should present its calculations and assumptions to show that the Big Sky Mine does not meet the thick overburden requirements of S10310(k). Montana does not have special performance standards for thin overburden so the statement on thin overburden should be removed.
- (18) Page 24, under "Reduction Requirements", the greatest slope of the reduced highwall should be stated as 5:1, because the department has found that 3:1 slopes generally have a low probability for reclamation success. Exceptions would consist of unusual circumstances where short steeper slopes were appropriate. Peabody should interact with the department if it appears that a 5:1 slope on a reduced highwall would necessitate excessive disturbance above the standing highwall.

Haulage of box cut spoils to the final pit should be discussed. (What portion of these, if any, will be used in backfilling the final pit?) In what condition will the box cut spoils be maintained until they will be hauled to the final pit? (The Department recommends they be left untopsoiled, but stabilized by mulch and vegetation and protected by ditches for the interception and retention of runoff and sediment).

The reference to permanent impoundments should be deleted, since Peabody declared on page 19 that no such impoundments are planned. Any differences between the highwall reduction/final pit backfill plan for the final pit in Section 15 and 22, and the final pit in Sections 13 and 14 should be explained separately in the narrative.

- (19) Page 25, Highwall Reduction: Under "Reduction Plan", second sentence, the reduced slope angle here should be 5:1, with exceptions as stated in items 6 and 18.

The "range diagram" Exhibit "V-1" does not show either the highwall reduction or regrading of the final spoil peak as suggested by the fourth sentence. The highwall reduction plan must be contained

somewhere in the application materials.

- (20) Pages 26 and 27, second paragraph. This section is a reiteration of pages 21 and 22 and the comments made earlier apply to this section as well.
- (21) Page 27, Buffer Zones: Under "Grading Transition", Item No. 1, change "Increase" to "Decrease".

Some of the proposed mitigative measures are considered to be less desirable by the department, especially items 2, 3, and 4. It is suggested that the stream channels be geometrically designed for maximum stability in the first place, and if, subsequently, problems arise, the department can then be contacted in order that an approved program of mitigative measures can be jointly arrived at.

- (22) Page 27, Roads and Railroad Loops: Peabody has proposed using parting material for road subgrades which is contrary to S10310(4)(g). Because this material could easily work its way up through the scoria surface material, its use will not be allowed by the department unless Peabody can demonstrate to the Department that this material will stay in the road subgrades. In the last paragraph, delete the reference to railroad subgrades since this application contains no proposal for railroad construction.
- (23) Page 29, Roads and Railroad Loops: Under "Proposed Roads", if Peabody Coal would give sufficient notice (i.e. two weeks) to the department when it plans to place the marking flags, it would be possible to preinspect the proposed sites during the usual mine inspection made by the department personnel. Also, delete "or railroads" in the last sentence, because railroad construction is not part of this application.
- (24) At the top of Page 30, reference is made to stabilizing cut and fill slopes. Is vegetation the sole means proposed to stabilize these slopes? What species will be used on these slopes?

The department requests that Peabody make a part of their plan a commitment in the narrative to strip topsoil for a distance of 10 feet or other appropriate distance from the edge of any road surface, embankment, ditch, or road cut for the purpose of the prevention of contamination of in-place topsoil. (This may be a compliance item after passage of the new rules anyway). Slope stabilization as covered in S10310(4)(f) might then be better accomplished by alternate means, such as riprap, especially on haul roads.

- (25) On page 30 under the heading "Completion of Operation", the words "not released from bond" in the first sentence should be deleted, and the phrase "any road or railroad loop" should be changed to

Mr. Terry O'Connor, Peabody Coal Company
Certified Mail No. 22078
Page Eight
July 16, 1979

"all roads and the railroad loop". A commitment to remove the railroad loop and facilities and regrade the area should be made.

Road material unsuitable for revegetation is proposed to be hauled and spoiled in designated scoria pits. The Department would prefer that this material be buried in the final coal mining pit and not the scoria pits. Would it not be possible to keep a portion of the final pit open until such time as all such materials were disposed of?

- (26) Page 31, under "Maintenance", the words "when technically and environmentally justified" must be deleted.

S10330 Water Quality

- (27) Page 34, S10330(3). Peabody should state that all sediment ponds will be built prior to any mining in the affected drainage.

- (28) Page 39, S10330(3), second paragraph. The Department feels that there is adequate legal justification to require a water quality control program. This statement should be removed.

- (29) Page 39, S10330(3)(b). Peabody should reference the water quality monitoring plan in Volume VII, Page 60-61b. Manganese may be deleted from the parameter list since all discharges will be alkaline. The purpose for monitoring the various forms of nitrogen are to determine if nitrogen is being cycled from ammonia in the overburden, to nitrite and nitrate after oxidation. Due to the high risk of water pollution from nitrogen compounds we feel that monitoring for these compounds is justified. The Kjeldahl nitrogen data would be difficult to interpret since it would be a total digestion; therefore, this parameter may be dropped. Lead, zinc, mercury and selenium have all been detected in the Colstrip area and warrant some concern. Vanadium is rare but may be found possibly as a result of wasted oil. Cadmium, copper and chromium are rarely found in the Colstrip area and phosphorous is low in overburden materials.

The Department requests, however, that Peabody complete this dishwasher list of elements and the need for continued monitoring will be reviewed by the department after a year of quarterly analyses. If Peabody can demonstrate that any of these parameters are safely below levels of concern for the Colstrip area including a discussion of surface waters, groundwaters and potential contamination from industrial residues, the Department will consider deleting the requirements for more data.

- (30) Page 40, S10330(4)(a). Peabody should reference the water monitoring scheme outlined in Volume VII, appendix 12, pages 60-61b.
- (31) Page 40, S10330(4)(b). Peabody should commit to a monthly reporting schedule for the water monitoring program to be referenced under S10330(4)(a) above, with annual summaries to be submitted on the annual reporting date.

The department requests that the postmining land use water resource management plan be submitted as part of the application.

- (32) Page 40, S10330(5)(a). If diversions around the disturbed area are not going to be used, Peabody should describe the volumes of water expected in the drainages and the method of handling this water. A description of how topsoil in drainages above the highwall will be kept from being washed into the pit should be included.
- (33) Page 41, S10330(7). Peabody should commit to controlling discharges from sediment ponds and diversions and show the calculations and manner in which discharges will be controlled.
- (34) Pages 41-42, S10330(8). Peabody should specify the acid and toxic materials that have been identified within the proposed permit area and specify how the material will be handled to avoid degradation of surface or groundwaters and prevent toxic effects on vegetation. Please change the reference to the "Open cut . . . Act" since this act does not apply to your operation.
- (35) Page 44, S10330(11). The department requests Peabody to submit air photography in stereo pairs preferably in color or color infrared of Snider's subirrigated alfalfa field and adjacent area. The purpose of the request is to conduct a reconnaissance evaluation of the land forms associated with the subirrigated field.
- (36) Page 46, in the first paragraph under "Topsoil Salvage and Redistribution", delete the phrase "or the soils being salvaged".

In the third paragraph, second sentence, for clarity it should be "the "A" horizon material and the "B" horizon organic material . . ." Also in the third paragraph, it should be made clear that A and B organic horizon material will be redistributed on B-C horizon material which has been respread on graded areas. This, of course, will be required whether direct haul or use of stockpiled topsoil occurs.

- (37) Page 47, under "Maintenance of Replaced Topsoil", delete "if necessary" in the second sentence. This change will make this portion of the application compatible with the revegetation section.

Mr. Terry O'Connor, Peabody Coal Company
Certified Mail No. 22078
Page Ten
July 16, 1979

- (38) Conversations with Peabody personnel have indicated that Peabody rips or discs the spoils surface prior to topsoiling. How does this relate to the discussion on page 48 under "Topsoil Stability"?
- (39) Page 61, in "Planting and Revegetation" section, regar brome should be substituted for smooth brome in the seed mixture.
- (40) Page 62, A firm commitment should be made to include more forb seeding when seed is available.
- (41) Page 63, a description of the general areas -- aspect, slope, and geographic location -- of proposed shrub and tree plantings and soil types that may be necessary for and thus will be selectively used to establish and maintain trees and shrubs should be given. Density of plantings should also be given.
- (42) Page 63, Russian Olive and Siberian peashrub are not native as stated.
- (43) Page 63, in the last paragraph, delete "if necessary" after the reference to discing and cultipacking.
- (44) Page 64, what species of small grains and how much will be used as a cover crop?
- (45) Page 65, soil amendments will probably be necessary in the form of nitrogen and phosphorus fertilizers to encourage initially rapid vegetative establishment. Respread topsoil data (Volume VI) indicate that N and P contents are very low. These parameters will probably be somewhat higher in surface soils with the two-lift operation, but some extraneous N and P additions will probably be necessary. This should be determined by appropriate soil tests.
- (46) Page 66, first paragraph, the department may require incorporation of a grazing system.

VOLUME VI

Soils

- (47) Acreages of the various mapping units should be determined for the areas proposed for mining level disturbance. The new associated disturbance areas and the scoria pit should be left out of this calculation. The scoria pit soils acreages should be calculated separately.
- (48a) Please explain the apparent lack of correlation between the saturation percentages, and the textures for samples of soils taken from mapping units 101 and 125.

- (48b) The conductivities were done on 1:5 extracts. This is unacceptable necessitating re-analysis of conductivities and saturation percentages of those samples where the sum of the cations was greater than 30 mg/l or the E_c (as determined) was greater than 3.0 mmhos/cm. The conductivities this time must be done on saturation extracts.

Overburden and Spoils

- (49) Conductivities of the majority of overburden samples relevant to the new mine area were done on 1:5 extracts. This is not acceptable and will require re-analysis as in (48b) above. Where possible, this analysis should be done on 20-mesh material. Complications are added if 60-mesh material is used.
- (50) The assertion in the first half of page 9 that the number of regraded spoils samples with clay contents greater than 40% is only about 10% only indicates the predominant textural characteristics of the spoiled overburden, since these samples were taken in areas where the innerburden has been buried. Thus, this statement concerning spoil texture, contrary to the implication in the text, is completely irrelevant to Peabody's desire to refrain from burying the innerburden. If anything, it supports the use of overburden as surface spoils material.
- (51) Core Holes 2115 and 1888 appear to have been mixed up in the designation of the various data sheets. Please straighten this out.

Cu-Mo Problem -- RE: Peabody's Submittal of April 30, 1979

- (52) The following vegetation samples do not appear to be located on Exhibit H-2: 1, 5, 9, 13, 17-21, 46 and 47.
- (53) Answers to the following questions are very important from the standpoint of interpreting the data:
- (a) What species of plants do the samples in Tables 4 and 5 represent?
 - (b) What parts of all plants analyzed were utilized in the analysis of molybdenum and copper?
 - (c) Did the vegetative tissue analyzed include only the current year's growth? Did it include older tissues? Did it include any standing dead vegetation or any flowering structures?
 - (d) When were the plants sampled?
 - (e) What species of mammals and invertebrates were sampled? What tissues of each were analyzed?

- (54) The various comparisons of Cu, Mo, and Cu:Mo ratios in plants between reclaimed and unmined areas could yield some very useful information if the reclaimed areas where samples were taken represent innerburden spoils that were not buried as part of reclamation. Do any of the vegetation samples come from such areas? If not, the only comparisons made were between undisturbed and reclaimed areas where the innerburden was buried, which is part of the presently practiced reclamation plan.
- (55) In the third paragraph under the heading: "The Study", the statement is made that Table 1 represents samples from innerburden material used as the final reclamation surface. This does not appear consistent with the map locations of the samples on exhibit H-2. Which of these samples specifically represent overburden spoils, which represent innerburden spoils, and which represent respread topsoil?

The preceding questions on overburden and spoils must be answered in order that the department can complete its evaluation of the overburden.

Vegetation Survey

- (56) Transect 25 is not in type 111.4 as listed in Table V, but rather 111.25 on the map. It is difficult to extropolate from field notes because there is no consistency in labeling the field note sheets as to location or number and type.
- (57) Transect 35 is shown on map to be in 111.35 but listed as being in 111-Y in Table V; 111.25 is an Agsm-Stco type, but the transect does not show Agsm as occurring.
- (58) Much of the transect data is given as averages in the tables rather than as individual transect data.
- (59) Type 213 is listed as a Rhtr-Stco-Cafi type but the data given as an average in the table show Calo to be clearly dominant. This discrepancy appears in other types also.
- (60) Transect 27 shows it to be a 212.1, not 212.2 as listed in Table 6.
- (61) The narrative descriptions of community type, their trend, condition, carrying capacity, etc., seem to be done well enough, but with some of the discrepancies listed above, the results are subject to question.
- (62) Sampling appears to be adequate and transects in each type are proportional to the area of types in the impacted area.

Archaeology

- (63) The archaeology study is incomplete at this time. Thus no assessment is possible.

Air Quality

- (64) The department and the Air Quality Bureau have not yet finalized a decision on additional monitoring that may be required.

VOLUME VII

Groundwater Hydrology

- (65) Page 17. In relation to the statement, "The clinker (scoria pits (Exhibit C-2)) was formed from burned coal seams. . . than either the McKay or Rosebud coal beds", explain the stratigraphic relationship as it now exists and why recharge cannot enter laterally into the McKay or Rosebud coal beds from the clinker.
- (66) Page 18, Peabody must present the data for the pump tests of wells BS-04, S-28, S-23, S-12 and BS-22. The data should include plots and calculations used to arrive at the aquifer characteristics listed in Table 4.
- (67) Page 19, the modified map in Exhibit Q must be submitted.
- (68) Page 20, the discharge areas (Exhibit P) shown must be related to the geology of the area. Peabody should show on a geologic map that the sub-McKay sandstone outcrops in the coulees as suggested on Exhibit P, or that there is an increasing potential with depth in this area (in the sub-McKay).
- (69) Page 25, explain how the range of vertical hydraulic conductivity of .43-4.9 feet per day for the spoil was determined. It appears that this range was based on water level fluctuations that occur 3-6 months after major precipitation events; however, groundwater recharge is said to occur to the west of the Big Sky Mine and migrates in a south-southwest direction. It appears that the fluctuations are caused by lateral flow to the spoils from the coal beds and not by vertical recharge.

As asked for in the June 5, 1978 letter, all data points that were used in the construction of the water level contour map must be clearly shown on the map to document that all the contours have a basis for being drawn.

- (70) Page 26b, explain how (include the data) it was "determined that the regraded spoil at the Peabody Big Sky Mine has greater vertical hydraulic conductivity than the undisturbed overburden material"?

Mr. Terry O'Connor, Peabody Coal Company
Certified Mail No. 22078
Page Fourteen
July 16, 1979

- (71) Page 45, explain the statement "Groundwater will be obtainable from mine cuts left without external drainage".
- (72) Page 49, the geologic and geologic structure maps of the area surrounding and including Snider's field were requested in the June 5, 1978 letter. These have not been received. Include data on the anticlinal structure in the area.

Appendix 12

- (73) Page 57. The department could not locate Table 17.
- (74) Page 58. As mentioned earlier the DNR impoundment and Miller Coulee diversions are all a part of permit 00004 and any future discussions should be addressed under the earlier permit number. This section should be removed from this application for the sake of clarity.
- (75) Page 60-61b. Comments on this section are contained under the department's comments for Volume 1, Table 6, page 39. It would improve the organization of the application if the water monitoring program were contained in the section dealing with S10330(4) monitoring.

Sedimentation Ponds

- (76) The department had difficulty reviewing the "notes" written in on each sediment ponds plan. The department requests that Peabody present all calculations leading to the pond design in an orderly fashion.

Peabody should also devise a method, such as a staff in the sediment ponds, to indicate when the ponds will require cleaning.

Aquatics Section

- (77) The aquatics section is a report for a study that was required under Surface Mining Permit No. 00004. This application is not the appropriate place for this report. The department will review the information under the earlier permit.
- (78) Pages 52-52c are duplicated in Volume 1, Table 4, page 22. The department's concerns may be found in Volume 1, Table 4 set of comments. The reiteration of this section is not necessary and should be removed.
- (79) Pages 52d, 3rd paragraph 52e, paragraph 1 are duplicated on Volume 1, Table 4, page 22 and this section should be removed to eliminate the repetition.

(80) Page 52c, paragraph 2. "Peabody believes that the postmining drainage should be designed based on sound design principals which are compatible with acceptable technical guidelines." Where are the design principals that Peabody used to arrive at a reclamation drainage plan? What are the acceptable technical guidelines that are mentioned? It is common knowledge that the native range adjacent to the Big Sky Mine has drainages which:

- (1) have gradients steeper than pre-mine channels;
- (2) exhibit channel gradients in the native range that have a convex gradient profile; and
- (3) have natural 'Knick points'."

These statements are true but let's look at each statement individually.

- (1) This statement merely shows how drainage channels have been constructed in the past and has no bearing on how drainage systems should be designed.
- (2) Our field experience has been that channel gradients respond to a variety of influences such as resistant strata, presence of materials that exceed the competency of the drainage, changes in particle diameter etc. It is not surprising therefore, that circumstances can be found where short stretches of convex longitudinal profiles do exist. Schumm (1961) provides an example of a convex longitudinal profile of a stream in a semi arid region. The reason for the convexity; however, was that the stream was losing water to infiltration and the volume of water decreased downstream. This does not appear to be the situation on the drainages at the Big Sky Mine and even if it was, mining may alter the infiltration characteristics to the point that the condition would not be restored after mining. Another situation where a drainage profile showed several irregularities along a generally concave profile was documented by Wolman (1955). This case is more parallel to the Big Sky situation where bedrock periodically influences the longitudinal profile, except on Brandywine Creek the irregularities appear to be a response to changes in lithology. In other words a stream appears to display a different degree of concavity in response to changes in rock type and yet the entire drainage system can still be at grade. Morisowa (1968) comments that in general longitudinal profiles are concave upwards with the exception of the cases noted above.

In conclusion, although irregularities can occur in a longitudinal profile, in general a drainage is trending towards an equilibrium condition in a dynamic fashion with the end result being a concave longitudinal profile.

The slope of the longitudinal profile is also a critical parameter to include as part of the reclaimed drainage system design. Work done by Schumm and Hadley (1957), and Patton and Schumm (1975), indicates that ephemeral drainages in the semiarid west increased their gradients through alluviation within the valley. When the valley slopes had steepened to a critical or "threshold" point then the valley would gully. The problem is apparent if reclamation drainages were restored to steeper profiles than what had existed prior to mining. Therefore, by restoring the drainages to similar channel geometry to the undisturbed drainage system with nearly the same longitudinal profiles and by utilizing topsoils that would give maximum stability a best possible reclamation design would result.

- (3) Schumm, S.A. and Hadley R.F. 1957, Arroyos and The Semiarid Cycle of Erosion American Journal of Science, Volume 255, March 1957, pages 161-174.
- (4) Schumm, S.A. 1961, Effect of Sediment characteristics on erosion and deposition in ephemeral stream channels: U.S. Geological Survey. Prof. Paper 352C.
- (5) Wolman, M.G. (1955). The natural channel of Brandywine Creek, Pennsylvania: U. S. Geological Survey, Prof. Paper 271.
- (1) Morisawa Marie (1968) Streams their dynamics and morphology. McGraw Hill Book Company, New York.
- (2) Patton P.C. and Schumm S.A. (1975). Gully Erosion, Northwestern Colorado: A Threshold Phenomenon Geology, February 1975.
- (3) Knick points are an indication of the dynamics of a drainage system in that the knick point probably formed as a result of oversteepening of the channel gradient due to deposition or in response to a large flow event. The knick point is a focus of energy in the drainage basin, that is out of equilibrium with the rest of the system. This focus of energy acts to down cut the irregularity in the profile in a trend towards an equilibrium condition where there is a uniform rate of energy expenditure downstream. The theory of dynamic equilibrium centers on the concept that an equilibrium state can be maintained even though fluctuations are "continuously compensated for through adjustments by the drainage system. In other words the small head cuts are the drainage systems attempt at achieving an equilibrium condition after the system had been knocked away from the equilibrium condition during an unknown set of circumstances

"Peabody's research indicates that postmine reclamation planning should take into consideration the natural site specific conditions."

The department would like to see the research that Peabody has conducted. What does Peabody mean, "reclamation planning should take into consideration the natural site specific conditions? The department has tried to take into account the site specific conditions present at the Big Sky Mine by encouraging Peabody to utilize the exposed resistant strata in their reclamation planning. If Peabody is concerned because the department will not allow them to incorporate knick points or oversteepened sections in their topography when the existing topography contains these features they should consider the benefits. Our experience has been that when unstable landforms are incorporated into the reclamation topography the erosion resulting occurs so rapidly that it is difficult for vegetation to get established to slow down the process. Hopefully Peabody can see the long range advantages of returning the reclamation landscape to as near equilibrium conditions as possible; thereby giving the landscape maximum stability in order to allow vegetation to be established and assist in stabilizing the reclamation topography. This rationale should give Peabody the best shot at getting their bond back after mining.

"It is our position that the drainage should have stability characteristics comparable to or greater than pre-mine conditions."

The department shares this position with Peabody with the exception that there is a strong difference of opinion regarding how this can best be accomplished.

"It is also our position that the required stipulations are extremely restrictive as well as requiring design criteria which cannot be technically justified." A statement declaring that the department is not technically justified in making a request, should be technically justified itself. The department has not been able to find any technical justification mentioned in the application to support Peabody's statement of position. The department has detailed their supporting arguments in the previous discussion, however, if Peabody wants to continue the difference of opinion their statements should be substantiated.

Wildlife

- (81) The present reclamation plan is unacceptable from a wildlife standpoint. More diversity of vegetation is needed; in particular, more attention should be given to forbs and shrubs. As a result of a meeting with Jim Lunan on June 12, 1979, the Department understands a new wildlife plan is forthcoming. The Department will therefore not comment further on the existing plan.

Maps

- (82) What is the need for the associated disturbance area near the northern boundary of the mine in the NE $\frac{1}{4}$ of Section 14?
- (83) Exhibit "E", Premining Topographical Map, and Drill Log Cross Sections: In order for department personnel to analyze the premining and postmining map pair, it is necessary to refer to the drill log cross sections to obtain horizon data. It has been noticed that the drill log cross sections are not entirely consistent with the premining topographical map of Exhibit "E". For instance, at location 130 on Drill Log Cross Section 2N.S, the elevation is given as 3,385 feet. On the Premining Topographical Map, Exhibit "E", the elevation at that point is read as about 3,563 feet, a discrepancy of more than 20 feet. A discrepancy of about 30 feet exists at location 104. Other locations on cross section 2 N.S are accurate. (It might be mentioned that the contour elevation marking of 3,350 to the SE of location 104 does not agree with the marking of 3,325 farther SE along the same line on the Premining Topographical Map).

Discrepancies such as the foregoing must be cleared up before the Department can finish its analysis.

- (84) Exhibit "F", Postmining Contour Map:

- A. The "3240" contour interior to the rail loop should probably be labeled "3220", which would not be acceptable because it would be an area which would not drain. The reasoning is as follows:
1. If one follows a line drawn from the "3240" contour in a NNW direction down across the 3230 contour, then up across the 3230 closed contour, the conclusion is reached that the closed 3230 contour is on a knob.
 2. If a person follows a line drawn easterly from the 3250 contour west of the loop down across the 3240 contour, then down across the closed 3230 contour, the conclusion is reached that the closed 3230 contour defines a depression, which is in contradiction to the first item (above).
 3. The contradiction is removed if the "3240" closed contour is relabeled 3220, but depressions would be deemed unacceptable as stated earlier.
- B. The northwest, southeast trending highwall at the western boundary of the mine disturbs an area that has very little drainage development on it. The Department theorizes that the sandy textured soils associated with the bluffs allows high infiltration resulting in little runoff available for forming drainage features on the landscape. When this long steep slope is disturbed through mining and replaced with a long

slope possessing lower infiltration rates it would be expected that more runoff would be available to develop a drainage system. The result would be a badly eroded reduced-highwall slope. The Department does not feel that the drainage created by leaving the pit at the base of the highwall meets the approximate original contour since it does not "closely resemble the general surface configuration of the land prior to mining". The Department proposes a reclamation approach that would better "compliment the drainage pattern" or lack of drainage pattern, "of the surrounding terrain". The following proposal would also better eliminate the "plateau" of spoils and the highwall as specified under A.O.C.

The Department suggests that the highwall not be disturbed above the recovery line. This would preserve the infiltration characteristics of these steep slopes as well as leaving the vegetative cover that otherwise may be difficult to reestablish. The spoil pile shown just to the east of the final pit as a "plateau" area could then be hauled up to backfill the highwall and complete the slope. The slope would still be long but by taking advantage of the infiltration apparently characteristic of the slope in its native state, runoff would be low and thus erosion would be minimized.

- C. The most common hillslope shape is one having a convex crest, a straight midslope, and a concave footslope. Studies that have been conducted indicate that the use of complex slopes (convex-straight-concave) have a lower net soil loss. Young and Mutchler (1969) found that soil losses from uniform straight slopes and convex slopes did not vary significantly; however, soil losses from concave slopes eroded about eight tons per acre less than the uniformly sloped plots. Similarly Hadley and Toy (1977) while measuring erosion on complex slopes found that the convex and concave slopes eroded approximately the same amount while soil loss off the straight slopes was approximately twice that occurring on the other slope shapes.

The Department, therefore, requests that Peabody break their reclaimed slopes into a complex slope including a convex crest, straight midslope and concave footslope.

- D. There is an extremely irregular and steep piece of topography depicted on the proposed postmining topography map that would be difficult to construct and would be highly unstable. The feature is located just below the northern postmining contour boundary line just west of the E 2,739,000 grid line. The feature should be removed and replaced with a more stable land form.
- E. The railroad loop has not been adequately graded to the approximate original contour. The department does not object to a ridge being left after reclamation but the cut slopes for the railroad

tracks should be removed and the feature better blended into the surrounding terrain.

- F. The most recent postmining topography map provided by Peabody is the clearest map that we have received. However, the Department requests that the smudges where reclaimed drainages mesh with the native ground be removed so that better evaluation of the transition between mined and unmined land can be made.
- G. Other comments regarding the postmining topography have been included under comments on the application text. These are recapitulated here:
 - 1. Provide new pre-mine drainage profiles.
 - 2. Provide postmining drainage profiles.
 - 3. Detail the thought process used to arrive at the reclaimed drainage design.
 - 4. Provide an evaluation of the most suitable soils (provide greatest stability) for valley bottom reclamation.
- H. If Peabody could provide literature citations that provide an understanding of the relative erosion rates associated with degree of slope versus length of slope the department would work with Peabody to optimize slope gradient and length.
- I. There is an apparent drafting error where two contour lines almost meet just northwest of the intersection of the W 679,000 and the E 2,737,000 grid lines. This should be corrected.
- J. The 3280 contour line just below the point described above has been mislabeled 3270. This should be corrected.

(77) Please submit two copies of the most recent version of Exhibit R -- Settling Ponds (Surface Water Plan).

Sincerely,

Dennis Hemmer, Chief
Coal Bureau
Reclamation Division

c: Brace Hayden
John Hardaway
Don Crane
Leo Berry

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APPENDIX B

LOCOMOTIVE EMISSION FACTORS

Gas	Emissions (tons/year)
NO _x -----	29.8
CO-----	4.0
SO _x -----	1.2

